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Vol. XVI, No. 4 APRIL, 1927

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

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THE SEVENTY-FIFTH ANNUAL CONVENTION—THE DIAMOND ANNIVERSARY MEETING—WILL BE HELD IN ST. LOUIS.

The 1927 Meetings of the American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy will also meet in St. Louis, same time and place.

For Association Roster and Roster of the Boards of Pharmacy, see pages x, xii, xiv and xvi.

For Roster of Officers of Pharmaceutical Assoc.—State and National, see pages xvii, xviii and xix.

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THE SECOND VOTE ON THE A. PH. A. HEADQUARTERS.

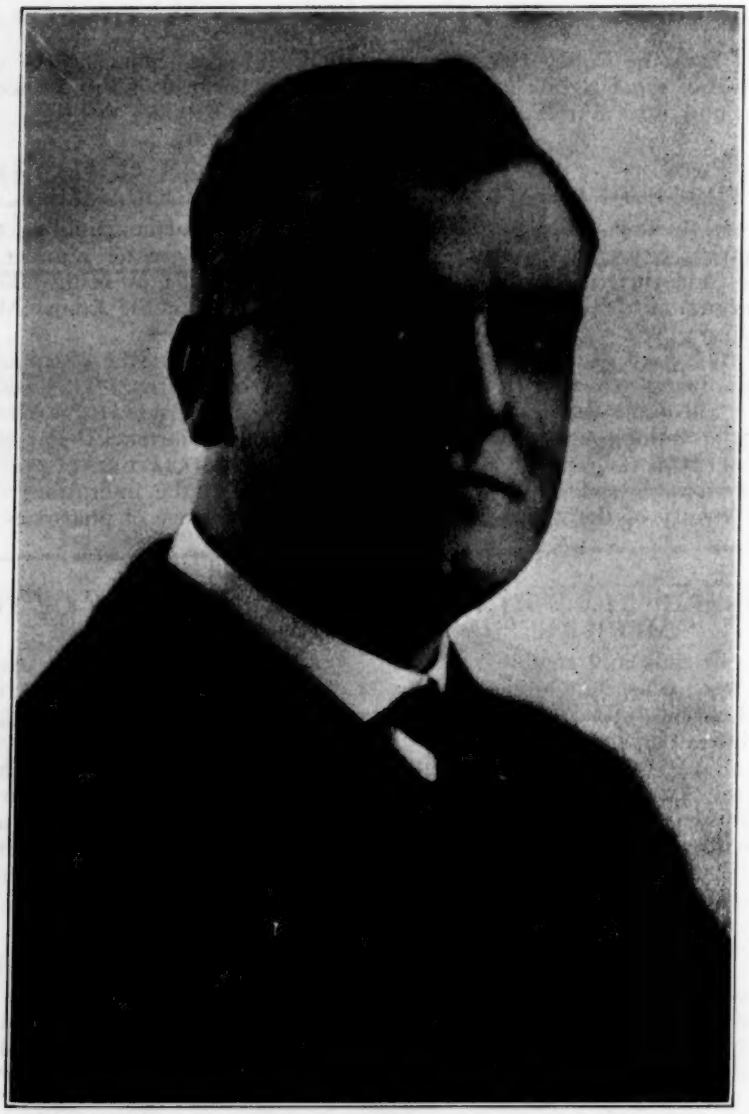
In the first ballot on the location of the Headquarters Building the following cities, in the order named, received the greater number of votes and their names appear on the second ballot, now being taken: Washington, D. C.; Chicago, Ill.; Cincinnati, Ohio; St. Louis, Mo.; Madison, Wis.

The continued and growing interest in the vote on the Headquarters is being attested by the greater number of returns. The second vote will name the two contestants for the final decision. The Headquarters and location means much to you as a pharmacist and as a member of the AMERICAN PHARMACEUTICAL ASSOCIATION. Opinions and viewpoints differ; the spirit which prompted the invitations and the loyalty of the members are tributes to the service of pharmacy.

CONTRIBUTIONS TO THE MUSEUM AND LIBRARY OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Friends and members of the AMERICAN PHARMACEUTICAL ASSOCIATION who contemplate giving or bequeathing books, manuscripts and articles of historical value are respectfully asked to enclose them in boxes or packages and mark them "for the AMERICAN PHARMACEUTICAL ASSOCIATION" and forward them to the Historian, 10 West Chase Street, Baltimore. This is in accord with a vote of the Section on Historical Pharmacy, at the recent Philadelphia meeting. Due acknowledgment will be made. The time to give this matter attention is "as soon as possible"—otherwise, the request may be forgotten.—Thank you!

Searchers in the records of pharmacy are impressed with the fact that pharmacists are very seldom named as such for their work in behalf of science and humanity—because they often carry on in work that characterizes other professions, but it remains that they are pharmacists.—Let us see to it that pharmacy receives credit for the service of pharmacists.



LEONARD A. SELTZER.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XVI APRIL, 1927 No. 4

LEONARD ADAMS SELTZER.

The first of the antecedents of the *Vice-Chairman* of the House of Delegates, A. PH. A., to settle in this country was Wyrich Seltzer, his great, great grandfather. He enlisted in the Continental Army at the beginning of the Revolution and served during the entire war.

The parents of our *Vice-Chairman* were Leonard A. and Susan Kilheffer Seltzer of Pennsylvania, who removed to Joliet, Ill., where the father, until his death in 1881, owned and conducted a drug business of a professional type. The subject of this brief sketch celebrated his 56th birthday October 12th of last year. He received his earlier education in the public schools of Joliet and graduated from high school in 1889. Thereafter, he entered the University of Michigan and was awarded his diploma by the college of Pharmacy in 1892.

After four years of training in the drug store of F. W. R. Perry, an active member of the AMERICAN PHARMACEUTICAL ASSOCIATION and an outstanding pharmacist of his day, Mr. Seltzer was for a time employed in the experimental laboratory of Parke, Davis & Co., Detroit. In 1896, in partnership with Mr. Perry, a professional pharmacy was established in the Shurly Building. Within two years Mr. Perry withdrew from the business and Mr. Seltzer became the sole owner. When this establishment outgrew its quarters in the Shurly Building, it was moved to the Kresge Building, where a staff of thirty people is employed in the pharmacy, which is conducted along professional lines. Mr. Seltzer has served on the Committees of Revision of the U. S. P. for the past two decades and also on three of the Revision Committees of the National Formulary. In 1914, he was appointed a member of the Michigan State Board of Pharmacy for a term of five years. He is a member of local, State and national pharmaceutical associations and takes an active part in all of them; he has served the AMERICAN PHARMACEUTICAL ASSOCIATION, of which he became a member in 1899, as first, second and third Vice-President.

In 1926, the Philadelphia College of Pharmacy and Science conferred upon him the honorary degree of Master of Pharmacy and, in the same year the University of Michigan honored him with the degree of Master of Science, "in recognition of having successfully combined a business career with devotion to science and long maintained a business organization generally recognized as a model in its field and served with distinction in the professional activities of pharmacy."

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase St., BALTIMORE, MD.

WHAT PHARMACY HAS DONE, WHAT IT IS AND ITS OPPORTUNITIES.

DR. W. W. CHARTERS, who directed the recent survey of pharmacy, states in the Preface of "Basic Material for a Pharmaceutical Curriculum that to a marked degree this investigation is a coöperative enterprise of the craft." He expresses "deep appreciation of the very delightful coöperation rendered by the members of the profession. Nobody who was approached failed to perform generously the arduous services often demanded by this sort of study." The quotations contain the substance for a series of comments and the outstanding thought is "coöperation" and the essentials thereto—"to perform generously the arduous services often demanded by this sort of study, and the delightful coöperation which marked this investigation as a coöperative enterprise of the craft." Therein is the essence of good service and of what is necessary for accomplishment, namely, willing, earnest, enthusiastic, delightful coöperation.

The book which contains the report and deductions of the survey will be reviewed in the JOURNAL, hence, comprehensive comment is not made and the statements are general. Readers will find some oft-repeated opinions to be not in accord with the investigations; thus, it will be found that there is more compounding in prescriptions than some would have us believe and more prescriptions are written for U. S. P. and N. F. preparations than reported in general terms by some writers. In the study it was sought to determine with care and exactness the duties of pharmacists and by objective methods to derive with accuracy and definiteness of detail the facts and principles necessary for the mastery of pharmaceutical duties, the purpose being to substitute fact for opinion. While, quite naturally, it was impossible completely to realize this the success is most gratifying. Whenever it was impossible to determine facts the consensus of opinion of experts was utilized instead of the opinion of individuals. The mass of facts which has been collected in this report affords a most interesting study not only for pharmacists but for others who seek to gain information relative to pharmacy's activities and place in business and professional life.

Dr. Charters, after a careful and open-minded study of the pharmacy curriculum for a period of several years, is definitely convinced that pharmacy is a profession rather than a trade. He states further "The materials that the pharmacist deals with are in many cases so dangerous in their effects upon physical well-being, and the problems that face him in handling these materials and in his contacts with the public require so much intelligence—if they are properly performed—that it is absolutely essential for him to have a rather wide and intimate acquaintance with the fundamental sciences upon which the art depends; and since the distinction between the trade and the profession lies essentially in the fact that the trade needs to know only the methods in order to be proficient while the profession needs to know the principles upon which the methods depend, it follows that pharmacy is a profession rather than a trade."

In turning the pages of the report one marvels how it was possible for so much work to be done in so brief a period by those whose time for this investigation was

of necessity limited by the work which provides them a living. The survey has certainly been worth while and gives us assurance that the contemplated investigation of the business side of pharmacy will prove to be equally valuable.

The splendid success of this coöperation emphasizes the accomplishments of pharmaceutical organizations which have worked together in other promotions and points to further possibilities after the Headquarters has been completed. All honor to those whose labor and energies are directed for the elevation of pharmacy and extending its domain of usefulness, and coördinating its services with those in related bodies so that original investigations may be productive of greatest good and best results.—E. G. E.

REGISTERED PHARMACISTS IN HOSPITAL DISPENSARIES.

THE Chairman of the Committee on Hospital Pharmacists, Minnesota—Miss Frances M. Greenwalt—presented a number of reasons why the experience requirement of candidates for State Board examinations should be made to include also experience gained by candidates in hospital pharmacies or dispensaries under fully qualified registered pharmacists. The further recommendation was made that all hospitals be required to have the services of registered pharmacists for all dispensing and compounding of medications.

In the opinion of Miss Greenwalt, if hospital pharmacy experience were given due credit it would bring the time nearer when all hospitals will be required to have registered pharmacists in charge of all dispensing and compounding. Surely, the latter requirement should obtain in the interest of public health. No matter how skilful a surgeon may be or how well trained by experience and otherwise well qualified a physician may be, an inexperienced dispenser may bring to naught the efforts of the former. The pharmacists are few indeed who have not noted the care which physicians exercise in the selection of a pharmacist for special compounding or when they desire exact information relative to a pharmaceutical subject. How unreasonable the attitude which permits unqualified men and women to endanger lives, because of economy, indifference or favoritism.—"The poor boy" arguments, that "higher qualifications are not needed in small communities" and "registered pharmacists are unnecessary for hospital dispensaries" have been the cause of many an error and unjust charges, and pharmacy has not infrequently suffered because of unfortunate accidents for which pharmacists were not responsible. It is to be hoped that wide publicity will be given to the Charters' Report, not only to those engaged in pharmacy, but to the laity—so that a better understanding of the importance of pharmacy to the life and health of the people may obtain.

The Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION passed resolutions, at the March meeting, deploring the unfortunate accident which caused the death of six infants.—See under "Local Branches" in this issue of the JOURNAL. However, timely the action, it will not be productive of results without continued promptings. Such occurrences should convey to the minds of those who can bring about improved regulations and conditions that they are negligent in their duties if they do not seek to correct faults in management, especially when life and health are concerned. Accidents will occur, but the causes leading to them should be removed, whenever they are so clearly shown as by the action of the Chicago Branch, A. PH. A.—E. G. E.

SCIENTIFIC SECTION

THE OCCURRENCE AND ALKALOIDAL CONTENT OF VARIOUS EPHEDRA SPECIES.

BY C. NIELSEN, H. McCAUSLAND AND H. C. SPRUTH.

Native Ephedra Species.—The following species of Ephedra, Gnetaceæ, are said to grow in the United States of America:

Ephedra nevadensis, Wats	*Ephedra viridis*, Coville	*Ephedra antisyphilitica*, Meyer
Ephedra californica, Wats	*Ephedra trifurca*, Torrey	*Ephedra pedunculata*, Engelm
	Ephedra torreyana, Wats	

These species of the Genus are found in certain localities of the Southern and Southwestern States, in arid or alkaline regions, in the deserts, on mountainous slopes, dry beds of water courses, etc.

From various sources, we are informed of their occurrence in the following localities:

Ephedra Nevadensis, Wats.—California, New Mexico, Arizona, Colorado, Utah, Nevada. (Honey Lake Valley, South into the Mojave Desert and the Colorado Desert, East into Utah, South to Mexico. On the Indian Reservations of the Southwest; on the North half of the White Mountains of Nevada; also Pyramid Lake, Lemmon; also Kern Valley and upper San Joaquin Valley.)

Ephedra Californica, Wats.—California, Colorado. (Mojave and Colorado Deserts, North as far as Western Fresno County, West to San Diego, South into lower California; on mountain slopes West of the Imperial Valley and down over the border; in Death Valley. Has also been found on North Coronado Island.)

Ephedra Viridis, Coville.—California, Nevada, Arizona, Utah. On mountain slopes (as high as 5000 to 7000 ft. alt.) of the desert ranges about the Mojave Desert, Owens Valley and Death Valley; North to the White Mountains and East through Nevada and Arizona to Southwestern Utah; also Ft. Tejon. In the San Bernardino Mountains East to Colorado River. In the desert region of Southern California about ten miles North of Westmoreland. Common in the coast mountains not far from Bakersfield, Coalinga, etc.

Ephedra Trifurca, Torrey.—Arizona, Colorado, California, perhaps Texas. (Mojave Desert, San Diego.)

Ephedra Antisyphilitica, Meyer.—Arizona, New Mexico, Southern California.

We have as yet no information as to the whereabouts in the United States of *Ephedra pedunculata*, Engelm, and *Ephedra torreyana*, Wats.

We have obtained samples of a few of these species from various sources. Some of these samples were identified, others were not. Their appearance is very much alike. They are shrubs, sometimes reaching a height of three to four feet, with woody trunks, green or yellowish green long-jointed stems, similar to those of the Chinese Ma-Huang, but heavier, having very small scale-like leaves at the joints. They are unisexual plants. None of the varieties received had flowers or fruits.

(*A.*) Figures 1, 2, 3 and 4.—*Ephedra californica*, Wats, supplied and identified by Frank A. Thackery, U. S. Dept. of Agric., Bur. of Plant Industry, gathered in August, sun-dried.

(*B.*) Figure 5.—*Ephedra* gathered in El Paso County, Texas, supplied by C. R. Orcutt, who was referred to us by Assistant Curator J. N. Rose of the Smithsonian Institution. Species not identified. Gathered in August.

(*C.*) Figures 6, 7 and 8.—*Ephedra nevadensis*, Wats, supplied and identified by Frank A. Thackery, U. S. Dept. of Agri. Bur. of Plant Industry. Gathered in August in three different localities, sun-dried.

Fig. 1.—Roots and base of *Ephedra californica*, Wats.

Fig. 2.—Stems and branches of *Ephedra californica*, Wats.

Fig. 3.—Branch of male plant, *Ephedra californica*, Wats.

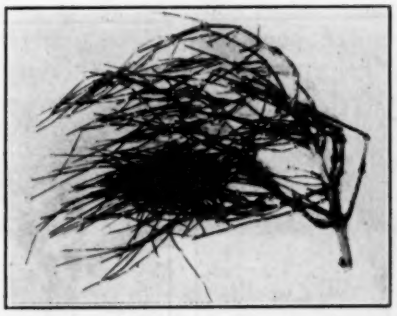


Fig. 4.—Branch of female plant, *Ephedra californica*, Wats.

Fig. 5.—*Ephedra* species from El Paso County, Texas.

Fig. 6.—*Ephedra nevadensis*, Wats. From California.

Fig. 7.—*Ephedra nevadensis*, Wats. From California.

(*D.*) Figure 9.—*Ephedra nevadensis*, Wats, supplied by A. N. Woodbury, Park Naturalist, U. S. Dept. of the Interior, Zion National Park, Utah; identified by Markus A. Jones. Gathered in July.

(*E.*) Figure 10.—*Ephedra viridis*, Coville, gathered and identified by Dr. Albert Schneider of the North Pacific College of Oregon, School of Pharmacy, Portland, Oregon. Gathered in Southern California, ten miles North of Westmoreland.

(*F.*) *Ephedra*, green branches of plants gathered in Death Valley, California by Mr. W. H. Foster, Colton, California who markets these under the name of "Ephedra, locally known as Squaw or Mormon-Tea." In all probability, a mixture of *Ephedra californica* and *Ephedra nevadensis*.

For detailed botanical description of these plants, see "California Flora," part III, page 65. They are alleged to have medicinal value (1 and 2). Several of the varieties have been known for a great many years to the population in the localities where they grow. The Indians used the decoction of the green stems as a remedy for many and varied ailments and, later, the use of the drug became popular among the Whites also. The various species are known in different localities under different names, such as Squaw Tea, Mormon-Tea, Mountain Rush, Whorehouse Tea, Teamsters Tea, Canutillo, Tepopote. The Coahilla

Fig. 8.—*Ephedra nevadensis*, Wats. From California.

Fig. 9.—*Ephedra nevadensis*, Wats. From Zion National Park, Utah.

Fig. 10.—*Ephedra viridis*, Coville. From California.

Indians are said to have used the seeds also (*Ephedra nevadensis*) eating them roasted.

The most popular use of these teas as a "folk medicine" seems to have been, and still is used as a cure for venereal diseases, but they are also credited with curative properties in other ailments. *Ephedra antisyphilitica*, *californica* and *nevadensis* are said to be beneficial in syphilis and gonorrhea, both as an injection and internally. The latter was also used by the Coahilla Indians to prepare a cooling drink. *E. trifurca* was reported years ago to be an excellent remedy for Bright's Disease. Some of the varieties have been used by the Indians in Arizona as a diuretic. In the early days, nearly all of the California pioneers traveling westward through the Desert had bunches of *Ephedra* hanging from their wagons (Teamsters Tea), using the tea for such diseases as mentioned or as a pleasant tonic. The strong decoction of the plant is also said to be beneficial for cancer sores.

Scientific pharmacologic and clinical data on the medicinal value of these plants are lacking. The information in the literature relating to their chemistry is scarce. Loew (3) reported that no organic base or alkaloid was present, that the aqueous extraction contained tannin, tartaric acid and pectin. According

to Loew "the tannin belongs to the glucoside groups, furnishing sugar on treatment with acid and various other compounds, and upon distillation pyrogallic and carbonic acids. The tannin splits up into sugar and a red amorphous powder," which he named "Ephedrin" and to which he attributed the remedial properties of the plant. Terry (4) analyzed *E. californica* and *nevadensis* and found no alkaloid present. He made some clinical experiments with the extract, fluid-extract and resin from these species, and found them to have relatively little therapeutic value, except for the tannin contained therein. Some diuretic effect was observed which he ascribed to the small amount of volatile oil in the stems.

It was of interest to us to determine whether any of these native *Ephedra* species contained ephedrine, isolated from Chinese *Ephedra* species by Nagai, Chen and others, or an alkaloid similar to it. The specimens were assayed for alkaloidal content in the order in which they are listed. The roots, stems and green branches were assayed separately whenever possible. The method employed was the U. S. P. IX method for belladonna root, using in the first step a mixture of chloroform, 1 volume and ether 3 volumes and methyl red as indicator, as suggested by Chen (5).

None of these native varieties of *Ephedra* contained any alkaloid.

We hope to obtain identified samples of *E. trifurca*, *antisyphilitica*, *pedunculata* and *torreyana* later with the view of assaying these species for alkaloidal content also.

Mexican Ephedra Species.—From the "Secretaria de Agricultura y Fomento," Bio. Dept. Botanical Section, Mexico, we are informed by Prof. Alfonso L. Herrera, Dir. of Biologic Studies, that the following species of *Ephedra* grow in Mexico.

Ephedra antisyphilitica, Berland. In Coahuila and Durango.

Ephedra aspera, Engelm. In Coahuila.

Ephedra pedunculata, Engelm. In Coahuila, San Luis Potosi and Chihuahua.

Ephedra californica, Wats. In lower California (Canutillo).

Ephedra trifurca, Torr. In Chihuahua.

Ephedra Sp. (?). On the Isle of Cedros.

Chinese Ephedra Species.—The drug (Fig. 11) commonly known in China for centuries under the name of Ma-Huang (astringent-yellow) contains ephedrine and pseudo-ephedrine, and is the chief source, perhaps the only source for ephedrine at present. This alkaloid was subjected to a very careful investigation in recent years by Chen, Read and co-workers. The description of Ma-Huang and of the chemical and pharmacologic character of its alkaloids, the clinical value of ephedrine with its important advantages over epinephrin has been given in detail by Chen, Read and co-workers (6), and need not be repeated here. Soon after these authors published the results of their preliminary investigations, ephedrine attracted a great deal of attention and a number of clinical reports, recommending its use, have since then appeared. This resulted in a rapidly increasing demand out of proportion to the limited supply, and it was in the hope of obtaining a more convenient source for ephedrine that our investigation of the native ephedras

Fig. 11.—Ma Huang—from China.

was undertaken. In the meantime, the scarcity of supply has been overcome. Large quantities of chemically pure Ephedrine hydrochloride (free from pseudo-ephedrine) from Ma-Huang, are now manufactured in U. S.

Chinese Ma-Huang may consist of more than one variety of Ephedra. Nagai, Chen and co-workers, Read *et al.* refer to their Ma-Huang as *E. vulgaris*, Rich. var. *helvetica* Hook. and Thomson. The Council on Pharmacy and Chemistry of the A. M. A. in their preliminary report on Ephedrine (7) refer to Ma-Huang as *E. equisetina*, Bunge and some other species of Ephedra. Holmes (8) considers it likely that the species sold at Peking would be *E. intermedia*, Schrenk and C. A. Meyer, var. *Tibetica*, Stapf., *E. equisetina* Bunge and *E. monosperma*, C. A. Meyer and states that *E. vulg.*, Rich. var. *helvetica*, Hook. and Thomson has been identified with *E. intermedia* S. and M. var. *Tibetica;* that *E. monosperma*, C. A. Meyer has been examined and does not yield the same alkaloid as Ma-Huang; and that *E. equisetina*, Bunge, therefore, requires examination as to its alkaloidal content, presuming that Ma-Huang consists chiefly of *E. intermedia* var. *Tibetica*, Stapf.

In the later communication Holmes (11) reports that a sample of Ma-Huang sent to him for examination has the characteristic appearance of *E. equisetina*, Bunge, adding that according to Professor Bernard E. Read, this is the plant now imported by the ton into the United States for the extraction of ephedrine. It comes from Peking.

The European variety identified by Arthur Meyer in 1902 as *E. vulgar.* var. *Helvetica*, according to Miller (6), yielded pseudo-ephedrine only. Chen (5) states that the European variety is not the same as the Asiatic and does not contain ephedrine; the alkaloid isolated from it and named pseudo-ephedrine by Merck (9) is an isomer of ephedrine; in a later article Chen and Kao suggest the possibility that *Ephedra vulgaris* var. *helvetica* yields ephedrine when grown in China, but pseudo-ephedrine when grown in Europe. They call attention to an analogous difference between the *l*-pinene in the French and Spanish oil of turpentine and the *d*-pinene in the Greek oils.

Merck's index for 1902 gives *Ephedra helvetica* (*gracilis*) as their source for ephedrine, and *Ephedra vulgaris* as the one for pseudo-ephedrine. In their Index for 1910, however, *Ephedra helvetica* C. A. Meyer is given as their source for both isomers. If these varieties contain pseudo-ephedrine only, was the ephedrine obtained by conversion?

It is evident that our knowledge of the species containing ephedrine or pseudo-ephedrine or both is in a state of confusion at present and will remain so until the *Ephedra* species and varieties shall have been definitely identified and classified with proper botanical nomenclature applied to each distinct species and variety, and then assayed for alkaloidal content. The probabilities are that the Chinese species are botanically and chemically different from the European ones. In the literature, we find mention of the following Chinese *Ephedras*.

1. *Ephedra intermedia*, Schrenk and C. A. Meyer, var. *Tibetica*, Stapf. (Northwest China) same as

Ephedra vulgaris, Rich. var. *helvetica*, Hook. and Thomson. Referred to by Chen as Ma-Huang. Reported by various investigators to contain ephedrine and pseudo-ephedrine.

2. *Ephedra equisetina*, Bunge (North China). Sold as Ma-Huang; used for the extraction of ephedrine.

3. *Ephedra monosperma*, C. A. Meyer (Northwest China). Does not yield the same alkaloid as Ma-Huang.

4. *Ephedra monostachya*. Does not contain the same alkaloid as Ma-Huang. From this variety Spehr (10) isolated a basic principle which he termed "Ephedrine," but this is different from the ephedrine isolated from Ma-Huang by Nagai, Chen and others.

5. *Ephedra Gerardiana*, Wall (West China and Sikkim). We have found no definite information as to its alkaloidal content.

The general appearance and histology of the Chinese *Ephedra* used by Chen has been described by him. The drug Ma-Huang as obtained on the market varies somewhat in appearance. Mostly, it consists of the upper part of the plant with part of the root attached. The base of the plant generally is a single stem and root, but at times it may consist of a gnarled mass of reddish brown stems from which the thinner roots and stems of the same color branch out. These stems carry a large number of green or yellowish green, stiff, straight, thin, brittle, many-jointed branches, apparently without leaves since these are very small triangular sheaths located at the joints and rudimentary in character. The drug is obtainable also without roots and brown stems, consisting then of the greenish sticks alone, broken into smaller pieces. The taste is aromatic, bitter and astringent.

The alkaloidal content in Ma-Huang varies. We have analyzed a number of samples and shipments and found anywhere from 0.2% to 0.9% of total alkaloid. The highest content was found in a batch consisting almost entirely of green sticks, the lowest in a shipment in which more than half by weight consisted of reddish brown roots, trunks and stems. We, therefore, separated these from the green sticks and assayed them. They contained no alkaloid. The same result was obtained with another batch. It appears, therefore, that the alkaloids are contained in the green branches only. We have not analyzed the flowers and fruits. One batch purchased in a Chinese store in Chicago and consisting of green sticks only had a penetrating aromatic odor, which remained during the entire process of extraction and became very pronounced in the isolated alkaloid.

European Ephedra Species.—According to Holmes (8), *Ephedra vulgaris*, Rich. is identical to *Ephedra distachya*, Linn. and is a distinct species different from *Ephedra helvetica*, C. A. Meyer. We have been informed of the presence of the following varieties in Europe:

1. *Ephedra distachya*, Linn., same as
Ephedra vulgaris, Rich. (East Tyrol), supposed to contain pseudo-ephedrine but not ephedrine.

2. *Ephedra helvetica*, C. A. Meyer (Switzerland, Italy, France), supposed to contain pseudo-ephedrine but not ephedrine.

3. *Ephedra Villarsii* (Italy).

4. *Ephedra fragilis Desf.* (Eastern Mediterranean).

5. *Ephedra altissima* (Switzerland).

6. *Ephedra Andina* (Switzerland).

In connection with these species, the information given to us by Mr. H. Correvon, founder of the Society for the Protection of Alpine Flora and Native Plants in Switzerland in answer to our inquiry regarding the plant we then called "*Ephedra vulgaris* var. *helvetica*" is of interest. He writes "It is found only in Canton Valais (around Sion) and is a rare plant; it is the Swiss form of *Ephedra distachya*, which in the environment of Suza, Italy is *E. Villarsii* and in East Tyrol

E. distachya (genuina). All three forms have the same aspect and differ only by botanic characters." In the U. S. Dispensatory 20th Edition, mention is made of *E. distachya*, L., stating that the branches and roots are used in Siberia as a remedy in gout and syphilis; also that the alkaloid of the species has been isolated and is different from ephedrine.

We are indebted to Dr. Albert Schneider of the North Pacific College of Oregon, Mr. Frank A. Thackery, U. S. Dept. of Agri., Mr. C. R. Orcutt, Mr. A. M. Woodbury, U. S. Dept. of the Interior, Dr. Ralph E. Terry, Oregon State Agri. College and Mr. W. H. Foster, Colton, California, for collecting the native *Ephedras* and furnishing much valuable information and to Prof. Bernard E. Read, Peking Union Medical College, Associate Curators, J. N. Rose and Paul C. Standley of the Smithsonian Inst., Prof. F. J. Smiley, Occidental College, California, Dr. Frank T. Greene, Dean of Cal. Univ. of San Francisco; Prof. P. J. Hanzlik, Stanford University, H. Correvon, Geneva, Switzerland, Prof. Alfonso Herrera, Mexico, Prof. H. M. Hall, University of California, Berkeley; H. P. Barss, Oregon State Agric. Col. and John A. Stevenson, U. S. Dept. of Agric. for their generous response to our inquiries on this subject.

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PHARMACEUTICAL DEPARTMENT,
ABBOTT LABORATORIES,
NORTH CHICAGO, ILL.

EPHEDRINE: ITS ISOLATION AND DETECTION FROM THE TOXICOLOGICAL STANDPOINT.*

BY KUEN TSIANG AND E. D. BROWN.

Ephedrine, an alkaloid obtained from an old Chinese drug, Ma Huang (*Ephedra vulgaris*) has been recently introduced as a new therapeutic agent and gives promise of possessing considerable merit. In 1924, Chen and Schmidt published a report on "The Action of Ephedrine" pointing out especially its effect

* From the Department of Pharmacology, University of Minnesota.

upon the circulation and its similarity to epinephrine in its chemical structure and in its action. Since this time, Chen has reported further results of his experimental investigation which has led to its clinical use in a number of conditions where it might rationally be expected to produce the desired result.

There is a fairly wide margin between the therapeutic dose and the toxic dose and there is little probability that death may result from its administration.

So far as we know, there has been no published report on the identification of the alkaloid, ephedrine, so we undertook to develop tests of identity. Ephedrine sulphate was used in making the tests which came to us from the Peking Union Medical College where it had been prepared as a product of their laboratory. Tests made by treating the dry alkaloid with the commonly employed reagents which in many cases give color reactions with certain alkaloids, were negative. This group consisted of the concentrated mineral acids: sulphuric, nitric and hydrochloric, and a group of other reagents including sulphuric acid with sugar, sulphuric acid with potassium dichromate, Froehde's reagent, and a solution of ferric chloride. A solution of the alkaloid was prepared and attempts made to

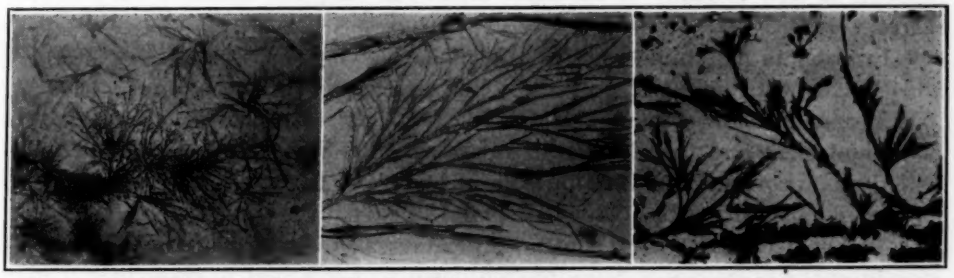

Fig. 1.—Ephedrine 1:1000. Gold chloride.

Fig. 2.—Ephedrine 1:1000. Platinic chloride.

Fig. 3.—Krauts reagent 1:1000.

obtain a characteristic crystalline precipitate with a group of alkaloidal reagents. Amorphous precipitates were produced by a large number of these reagents, but these would not serve as a means for the identification of the alkaloid. Four of the reagents employed gave crystalline precipitates which were very satisfactory. These crystalline precipitates appeared to be fairly characteristic for the alkaloid and may be employed as a means for identification. The reagents employed for these tests are described as follows:

Millon's Reagent.—This reagent when added to a drop of a solution of the alkaloid on a glass slide in dilutions of 1–100 or preferably 1–50, forms beautiful, star-like or leaf-like crystals. The crystals are slow in forming and are variable in shape depending on the concentration.

Gold Chloride.—This is a sensitive test. Fine needle-like crystals, some in the form of rosettes, were given by a 1–2500 solution. A 1–1000 solution, however, gave crystals possessing a more striking appearance, Fig. 1.

Platinic Chloride.—This reagent was also found to be very sensitive. Crystals were formed in a dilution of 1–10,000, but a 1–1000 solution gave better results. The crystals are inclined to be acicular, but have a strong tendency to branch or to be so arranged as to resemble the branches of a bush or tree, Fig. 2.

Kraut's Reagent.—With this reagent there is also produced what might be

considered a characteristic crystalline precipitate. In dilutions of 1–1000 or 1–500, needle-like crystals are formed which have a marked tendency to branch, giving the appearance of bushes, Fig. 3. In dilutions of 1–100 the tendency is for the crystals to be arranged in the form of rosettes.

In all the above tests it is well to emphasize that the formation of crystals occurs slowly.

In view of the fact that ephedrine bears a close relationship in chemical structure to both epinephrine and tyramine, the same tests were made with these substances.

In some instances, especially with Kraut's reagent, there is a similarity in the crystals formed which might be confusing. Any doubt, however, may be overcome by the use of ferric chloride solution which gives a color reaction with epinephrine and tyramine owing to the presence of the OH group on the benzol ring. This is not the case with ephedrine.

Caffeine also gives a somewhat similar precipitate with gold chloride and Kraut's reagent, but the absence of a precipitate with platinic chloride and Millon's reagent, as well as many of the other alkaloidal reagents, makes it easy to rule it out.

In order to determine whether the ephedrine could be isolated and detected when mixed with animal tissue, the following experiment was made.

A small amount of the alkaloid was thoroughly mixed with a liberal amount of ground meat and the alkaloid extracted by the Stas-Otto method. The alkaloid was recovered in a very pure form and gave the same microchemic tests as the original drug.

This experiment would give no indication as to how long the drug might remain in the body before being broken down, but it serves to show that it may be recovered and identified if present.

EDITORS NOTE: "A Study of Ephedra Nevadensis," by Ralph E. Terry will follow in the May issue of the JOURNAL.

THE STANDARDIZATION AND STABILIZATION OF ACONITE PREPARATIONS.—PAPER III.

BY EDWARD E. SWANSON AND CHESTER C. HARGREAVES.

1. Review of previous data.
2. Methods of assay.
3. The assay of five series of tinctures and fluidextracts.
4. The hydrogen-ion concentration or p_H value.
5. Conclusions.

In two previous articles (1, 2) by comparing the chemical method U. S. P. IX with the biochemical method now official in U. S. P. X, on a number of aconite drugs, tinctures and fluidextracts, it was found that the chemical method is unreliable. This method assays the total ether-soluble alkaloids, which are similar in chemical properties toward solvents and precipitants, but not similar in toxicity and pharmacological action. The biochemical method, which has been found to be more accurate, determines the total amount of toxic alkaloids in terms of a standard aconitine, which is regarded pharmacologically and therapeutically

as the important alkaloid. It was also found that the tinctures and fluidextracts of Aconite U. S. P. deteriorate rapidly within one year, and furthermore that this loss in activity can be partially or totally prevented by the addition of acetic or hydrochloric acid in the finished percolate or menstruum. The presence of an acid will prevent rapid deterioration and stabilize the activity of aconite preparations for at least three years. The deterioration may be due to the decomposition or hydrolysis of the alkaloids. It was found that by preparing solutions of the pure alkaloids, aconitine, diacetyl aconitine, benzylaconine and aconine in 70% alcohol and 70% alcohol plus acid, the deterioration and stabilization were similar to that of the tinctures and fluidextracts of aconite. Therefore, the deterioration, decomposition or hydrolysis of tinctures and fluidextracts of aconite and of the pure alkaloids,which are prevented by the presence of acetic acid, or hydrochloric acid, may be a question of hydrogen-ion concentration. The hydrogen-ion concentration of each tincture and fluidextract was determined. The preparations containing an acid gave a distinctly higher p_H value, however both acetic acid and hydrochloric acid 36% were used. In determining the hydrogen-ion concentration, hydrochloric acid always gives a more distinct p_H value than acetic acid, therefore the following data represents the use of hydrochloric acid given in terms of absolute hydrochloric acid.

The object of this article is to study more carefully the question of the hydrogen-ion concentration factor, or to determine if a definite p_H value will control the deterioration and stabilization of aconite preparations.

METHODS OF ASSAY.

The efficiency of the biochemical method not only depends upon the aconitine *value*, but also upon a standard method of *technic*. The accuracy of the method depends upon a standard weight of guinea-pigs, the seasonal variation of guinea-pigs, which is controlled by a standard aconitine, the acclimation of guinea-pigs to laboratory surroundings, the use of starved or non-starved guinea-pigs, the dilution of the preparations to be tested, and finally the amount to be injected.

The following method of assay has been used in this work:

Guinea-pigs weighing 275 Gm. to 325 Gm. are starved for 24 hours (by starving the results are far more consistent) they are kept in the laboratory or animal department for one month on a standardized diet. They are usually smaller than the required weight, and are kept until they reach the desired weight, at the same time acclimating themselves to the laboratory conditions. The dose is calculated according to weight. The fluidextract is diluted (1–10) with distilled water; the tincture not requiring dilution. Each calculated dose, diluted with normal saline solution to a total of 1 cc., is injected into the subcutaneous tissue of the abdomen. The lethal dose is determined as the smallest amount, that will kill within 6 hours.

Rowe (3) reported the use of mice, comparing them with the guinea-pig. He found that it required about 6.25 times as much of the drug to give the same results in mice as in guinea-pigs. Considering the difference in cost which is an important factor in all manufacturing procedures, the use of mice should be considered; therefore, the writers have used Rowe's White Mice Method in comparison with the guinea-pig method.

The following series of tests represents the use of more than 1000 guinea-pigs and at least 900 mice.

SERIES I.

Prepared on 2–10–25 a regular lot of fluidextract of Aconite U. S. P. which assayed by the chemical method 0.3785 Gm. of ether-soluble alkaloids per 100 cc. and assayed by the biochemical method 0.000040 Gm. per Gm. weight of guinea-pig. The alcohol content was 67.42%. This lot was divided into six parts, hydrochloric acid added to each part as given in the following table. Each part or sample was assayed chemically and biochemically and the hydrogen-ion concentration determined by the electrometric method. The following table represents one year and 7 months' aging.

Sample number.	HCl Gm. in 100 cc.	p_H 2–10–25.	p_H 3–29–26.	M. L. D. G. 9–20–26.	M. L. D. M. 9–20–26.	Per cent activity pig.	Per cent activity mouse.	Ratio M. L. D.'s.
1	0.072	4.10	4.02	0.000040	0.00040	100	100	1–10
2	0.054	4.40	4.40	0.000045	0.00045	89	89	1–10
3	0.036	4.70	4.90	0.000055	0.00060	72.7	66⅔	1–10.9
4	0.027	4.90	5.00	0.000080	0.00070	50	57	1– 8.7
5	0.009	5.20	5.20	0.000150	0.00090	26.6	44.4	1– 6
6	0.0045	5.35	5.27	0.000150	0.00090	26.6	44.4	1– 6

The deterioration is dependent on the hydrogen-ion concentration and the deterioration increases as the hydrogen-ion concentration decreases. This series of experiments required 0.072 Gm. HCl per 100 cc. or a hydrogen-ion concentration of 4.02 to 4.10 to prevent deterioration.

SERIES II.

Prepared on 2–29–25 a regular lot of fluidextract of Aconite U. S. P., which assayed 0.21 per 100 cc. of ether-soluble alkaloids by the chemical method, and assayed 0.000040 Gm. per Gm. weight of guinea-pig by the biochemical method. The alcohol content was 64.28%. This lot was divided into 6 parts, hydrochloric acid added to each part as given in the following table. The hydrogen-ion concentration was determined by the electrometric method. Each sample or part was tested about one year and 8 months later.

Sample.	HCl Gm. per 100 cc.	p_H 4–29–25.	p_H 1–6–26.	Bio-assay M. L. D. G. 10–16–26.	Bio-assay M. L. D. M. 10–16–26.	Per cent activity pig.	Per cent activity mice.	Ratio M. L. D.'s
1	0.144	3.38	3.56	0.000040	0.00040	100	100	1–10
2	0.072	4.44	4.70	0.000045	0.00045	89	89	1–10
3	0.036	5.20	5.27	0.000060	0.00065	66⅔	61.5	1–10.8
4	0.018	5.45	5.43	0.00015	0.0010	26.6	40	1– 6.6
5	0.009	5.55	5.53	0.00025	0.00175	16	22.2	1– 7
6	None	5.70	5.60	0.00030	0.0025	13.3	16	1– 8.3

The above data show that the deterioration is dependent on the hydrogen-ion concentration, and the deterioration increases as the hydrogen-ion concentration decreases. This series of experiments required 0.144 Gm. HCl per 100 cc. or a hydrogen-ion concentration of 3.38 to 3.56 to prevent deterioration.

SERIES III.

Prepared on 2–29–25 a regular lot of tincture of Aconite U. S. P., which assayed 0.0220 Gm. of ether-soluble alkaloids by the chemical method, and assayed 0.00040 Gm. per Gm. weight

Sample.	HCl Gm. per 100 cc.	p_H 4–29–25.	p_H 1–6–26.	Bio-assay M. L. D. G. 10–30–26.	Bio-assay M. L. D. M. 10–30–26.	Per cent activity pig.	Per cent activity mice.	Ratio M. L. D.'s.
1	0.144	1.58	1.63	0.00040	0.0040	100	100	1–10
2	0.072	2.00	2.10	0.00040	0.0040	100	100	1–10
3	0.036	2.40	2.50	0.00040	0.0040	100	100	1–10
4	0.018	3.20	3.35	0.00040	0.0040	100	100	1–10
5	0.009	4.58	5.05	0.00055	0.0050	72.7	80	1– 9
6	0.0045	4.88	5.53	0.0025	0.0090	16	44.4	1– 3.6
7	None	5.13	6.05	0.0050	0.0175	8	22.2	1– 3.5

The above data show that the deterioration and stabilization is dependent on the hydrogen-ion concentration or p_H value.

of guinea-pig by the biochemical method. The alcohol content was 69.42%. This lot was divided into seven parts, hydrochloric acid added to each part as given in the following table. The hydrogen-ion concentration was determined by the electrometric method. The following table represents about one year and 8 months' aging.

SERIES IV.

Prepared on 3–15–26 a regular lot of fluidextract of Aconite U. S. P., which assayed 0.28 Gm. of ether-soluble alkaloids per 100 cc. by the chemical method, and assayed 0.000030 Gm. per Gm. weight of guinea-pig by the biochemical method. The alcohol content was 64.84%. This lot was divided into seven parts, hydrochloric acid added to each part as given in the following tables. The hydrogen-ion concentration was determined by electrometric method. The following table represents about 9 months' aging.

Sample.	HCl Gm. in 100 cc.	p_H 3–29–26.	Bio-assay M. L. D. G. 12–10–26.	Bio-assay M. L. D. M. 12–10–26.	Per cent activity pigs.	Per cent activity mice.	Ratio M. L. D's.
1	0.36	1.05	0.000030	0.00030	100	100	1–10
2	0.288	1.30	0.000030	0.00030	100	100	1–10
3	0.144	2.00	0.000030	0.00030	100	100	1–10
4	0.072	3.60	0.000030	0.00030	100	100	1–10
5	0.036	4.20	0.000030	0.00030	100	100	1–10
6	0.018	4.60	0.000045	0.00040	66⅔	75	1– 8.8
7	None	5.10	0.000065	0.00060	46.1	50	1– 9.2

The above data show that deterioration is dependent on the hydrogen-ion concentration, and the deterioration begins when the hydrogen-ion concentration is 4.60 or it required 0.072 Gm. HCl per 100 cc. or a hydrogen-ion concentration of 3.60 to prevent deterioration.

SERIES V.

Prepared on 3–15–26 a tincture by diluting fluidextract of Aconite Series IV with 70% alcohol. This tincture assayed 0.028 Gm. of ether-soluble alkaloids per 100 cc. by the chemical method, and assayed 0.00030 Gm. per Gm. weight of guinea-pig by the biochemical method. The alcohol content was 68.5%. The lot was divided into seven parts, hydrochloric acid added to each part as given in the following table, the hydrogen-ion concentration determined by the electrometric method. The following table represents about 9 months' aging.

Sample.	HCl Gm. in 100 cc.	p_H 3–29–26.	Bio-assay M. L. D. G. 12–20–26.	Bio-assay M. L. D. M. 12–20–26.	Per cent activity pigs.	Per cent activity mice.	Ratio M. L. D.'s.
1	0.036	2.23	0.00030	0.0030	100	100	1–10
2	0.028	2.63	0.00030	0.0030	100	100	1–10
3	0.014	3.25	0.00030	0.0030	100	100	1–10
4	0.007	4.52	0.00035	0.0033	85.7	90	1– 9.5
5	0.0035	5.12	0.00060	0.0055	50	54.5	1– 9
6	0.00175	5.37	0.00125	0.0070	24	42.8	1– 5.6
7	None	6.00	0.0035	0.010	8.57	30	1– 2.9

The above data show that deterioration and stabilization is dependent on the hydrogen-ion concentration.

THE HYDROGEN-ION CONCENTRATION OF p_H VALUE.

The series of five experiments seem to show that the hydrogen-ion concentration of p_H value controls value the deterioration and stabilization of aconite preparations. Series I required 0.072 Gm. per 100 cc. or a p_H value of 4.02 to 4.10 to prevent deterioration; Series II required 0.144 Gm. per 100 cc. or p_H value of 3.38 to 3.56; Series III required 0.018 Gm. HCl per 100 cc. or p_H value of 3.20 to 3.25; Series IV required 0.036 Gm. HCl per 100 Gm. or p_H value of 3.60 and Series V required 0.014 Gm. HCl per 100 cc. or p_H value of 3.25. Of course, Series I, II, IV are fluidextracts and should require more acid than the tincture,

but for each series, regardless of fluidextract or tincture, it required a different amount of acid to give the p_H value desired to stabilize the activity, in other words a given constant amount of hydrochloric acid will not control the hydrogen-

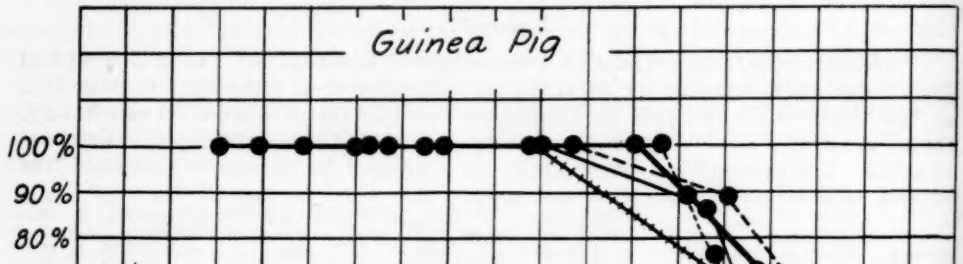

Fig. 1.

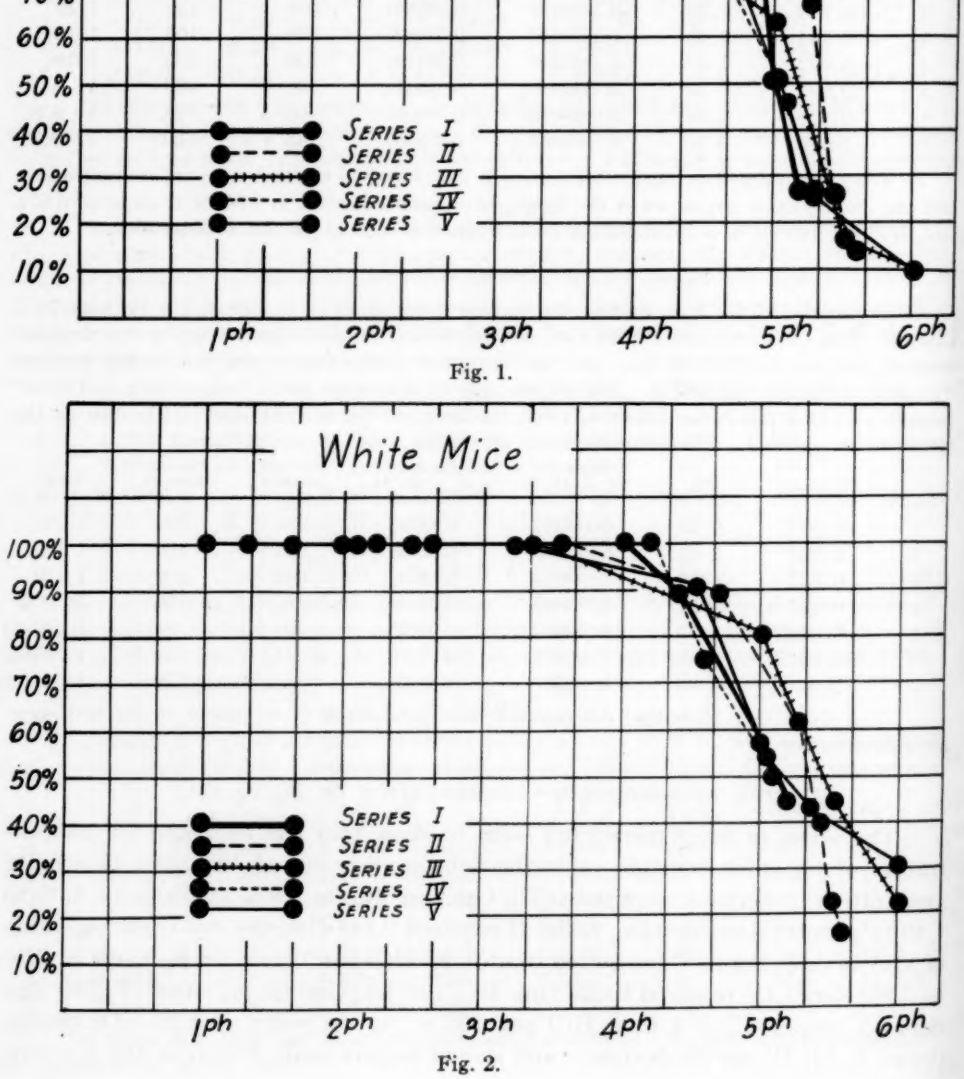

Fig. 2.

ion concentrations of p_H value. The desired p_H value is controlled by the amount of alkaloids and inert substance in the drug. The amount of alkaloids and inert extracts is not constant in all aconite drugs and preparations, therefore requiring different amounts of acid to give the desired p_H value. It seems to the writers that all aconite preparations should have a hydrogen-ion concentration or p_H value of not less than 3.00 or perhaps 2.50 would be a safer figure to stabilize and prevent deterioration.

Figure 1 represents curves of the five series of experiments as determined by the guinea-pig method.

Figure 2 represents curves of the five series of experiments as determined by the mouse method. The two methods agree remarkably well as regard the stability point, but as the deterioration increased they became less correlative. The guinea-pig method indicated a greater deterioration than the mouse method as the p_H value decreased. However, this may be an alcoholic factor. The writers having experimented on both methods found that 10% to 20% alcohol, 95% added to each calculated dose for guinea-pig and mouse, will not change the correlation but that 30% to 40% of alcohol, 95% added to each dose for guinea-pig and mouse, will inverse the correlation or decrease the toxicity on guinea-pigs and increase the toxicity on mice. Thus, in the preparations that have deteriorated the dose will be large for both guinea-pigs and mice, and the greater the deterioration the larger the amount of drug to be injected, and the larger the amount of alcohol that is injected. Weight for weight the mouse required 6 to 10 times as much of the drug as the guinea-pig, and therefore, the mouse receives 6 to 10 times as much alcohol. Furthermore, the drug is given subcutaneously to guinea-pigs and intraperitoneally to mice, which undoubtedly will show some difference. This problem will be more carefully studied and reported later.

CONCLUSIONS.

1. It has been shown that the hydrogen-ion concentration or the p_H value controls the deterioration and stabilization of aconite preparations.
2. It is recommended that tinctures and fluidextracts of Aconite U. S. P. have a p_H value of 2.5 and not less than 3.00 in order to prevent deterioration.
3. It has been shown that the amount of acid required to produce the desired p_H depends upon the amount of alkaloids and inert material present in each lot of drug.
4. The guinea-pig method and white mice method agree remarkably well on standard aconite preparations, but do not agree when the deterioration factor is determined.

The writers are much indebted to Mr. T. Hoover and Mr. A. L. Caldwell for the electrometric determinations and to Mr. H. W. Rhodehamel and Miss L. Carter for suggestions and criticisms.

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LILLY RESEARCH LABORATORIES,
ELI LILLY & COMPANY, INDIANAPOLIS.

THE GLUCOSIDES OF CAULOPHYLLUM THALICTROIDES.

BY EDWARD D. DAVY* AND H. P. CHU, M.D.**

The unexpected difficulties encountered in an attempt to isolate the glucosidal principles from the rhizome and root of *Caulophyllum thalictroides* (Linné), Michaux (Caulophyllum, N. F.), according to the method of Power and Salway, prompted the undertaking of a more extensive examination of the drug with some rather interesting results.

Caulophyllum, commonly known as "Blue Cohosh" and indigenous to North America, has been the subject of considerable chemical study since the first reported finding of an alkaloid by F. F. Mayer in 1863.

A review of the earlier history of Caulophyllum may be found in the report of J. U. Lloyd on "Caulophylline."[1] This review includes the work of F. F. Mayer,[2] A. E. Ebert,[3] and also his own earlier work.[4] In brief, these records show the isolation in pure form of an alkaloid, crystallized only as a hydrochloride; and of a crystalline glucoside.

Power and Salway,[5] continued the work and determined the chemical composition of these and other principles which they found. They isolated and crystallized the alkaloid and found it to be methyl cytisine, $C_{12}H_{16}ON_2$, m. p. 137° $[\alpha]_D$ —221.6; two glucosides were found and named, caulosaponin, $C_{54}H_{88}O_{17}.4H_2O$, m. p. 250–255° and caulophyllosaponin, $C_{66}H_{104}O_{17}$, m. p. 250–260° $[\alpha]_D$ +32.3; also citrullol $C_{28}H_{48}O_5$ or $C_{28}H_{45}O_2(OH)_3$, an enzyme, fixed oil and a small amount of volatile oil.

At the suggestion of Dr. Torald Sollman the writers began the work of isolating the various constituents from the drug with the intention eventually to determine to which of these agents the physiological activity may be assigned. We are also indebted to him for valuable suggestions on the work.

The drug used was obtained in crude form soon after collection, carefully assorted and dried at 43° before grinding, the same lot of drug being used for all work reported in this paper. We hereby express our thanks to Dr. E. E. Stanford for the selection and examination of the crude drug.

A. Isolation of the Glucosides.—The method of Power and Salway for the separation of the glucosides was followed, namely, (1) extraction of the drug with hot alcohol, with subsequent evaporation of the alcoholic solution to extract, (2) steam distillation of the extract for the separation of the volatile oil, (3) removing the glucosides from the aqueous residue with amyl alcohol, with subsequent removal of most of the amyl alcohol by distilling under reduced pressure, (4) precipitating the glucosides from amyl alcohol extract with ether, (5) crystallization of the glucosides from alcohol. The method resulted in the recovery of alcohol-soluble glucoside, which, however, was not crystallizable.

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* Department of Pharmacy, Western Reserve University.
** Department of Pharmacology, Western Reserve University.

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[4] "Drugs and Medicines of North America," 2, 154 (1887).
[5] *J. Am. Chem. Soc.*, 103, 193 (1913).

B.—The disappointing results obtained by this method (*A*) caused us to vary the procedure by taking advantage of the water insoluble quality of the glucoside. The drug was extracted with ether in a modified continuous extraction apparatus. The extract, after distilling the ether, was steam distilled, thereby obtaining a small amount of volatile oil. The residue was then extracted with petroleum ether, giving fixed oil. (A small amount of glucoside was also recovered.) After freeing the extracted drug from ether it was digested with hot alcohol, percolated, and the percolation continued with hot alcohol. Upon distilling the alcohol from the percolate a reddish brown extract was obtained. This was thoroughly mixed with pumice and quartz sand; then water added, after which it was filtered. The deposit on the filter was thoroughly washed with water, dried, dissolved in hot alcohol and filtered through animal charcoal. (Another portion was filtered through "Norit" with no particular advantage.) The alcohol was again removed and the above washing repeated, after which the precipitate was dried, dissolved in alcohol, filtered and evaporated. The dried product was then washed successively with petroleum ether and chloroform. This again resulted in the separation of the alcohol-soluble glucoside. The color was light yellow m. p. 210–220° $[\alpha]_D$ +31.2, but the material was not crystallizable from alcohol, varying hydroalcoholic solutions, alcohol with chloroform, with benzene, with carbon tetrachloride, or with benzine. Alcoholic solutions allowed to evaporate spontaneously produced no crystals.

C. Isolation of the Alkaloid.—The aqueous filtrate from the washing of the original extract B was evaporated to a syrupy consistence, sodium bicarbonate added and the mass extracted with chloroform for the separation of the alkaloid. (It was found that the dilute aqueous solution did not yield the alkaloid to chloroform even when made alkaline and saturated with sodium chloride.) The alkaloid was purified in the usual manner, using a minimum of dilute acid to shake out the chloroformic solution. The hydrochloride was formed in the final chloroformic solution by passing dry hydrochloric acid into it. This yielded a colorless flocculent precipitate, but upon the addition of alcohol (95%) and warming to dissolve the salt, followed by ether to a slight cloudiness, the alkaloidal hydrochloride was obtained in very fine acicular crystals, m. p. 120°, without decomposition, $[\alpha]_D$ −126.

The base methyl-cytisine reported by Power and Salway had m. p. 137° $[\alpha]_D$ −221.6; the hydrochloride decomposing at 250–255°. They state in a footnote that the water of crystallization in this salt could not be directly determined, since the substance slowly loses hydrogen chloride on dehydration.

D. Enzyme Action. (*1*) *Crystallizable Glucoside Sparingly Soluble in Alcohol.*—Our inability to isolate the crystalline glucoside or glucosides directly, led to further work taking into account the presence of enzyme.

A portion of the drug was moistened with water and kept in a closely covered vessel so that at no time did it become dry. It was kept at room temperature for one week (no decomposition was apparent by odor or growth of moulds), then dried, extracted with hot alcohol as before, the alcohol reduced by distillation, sand and pumice added, after which it was washed with water, dried, extracted from the sand pumice mixture with hot alcohol and filtered. The alcoholic solution was still highly colored, but a sparingly-alcohol-soluble glucoside crystallized

very readily from it. After re-crystallizing twice from alcohol, it was obtained in colorless silky needles m. p. 243–246° $[\alpha]_D$ +45. By evaporating the alcoholic liquor from which the above glucoside was crystallized, repeating the washing with water and crystallizing from alcohol, additional glucoside as above was obtained, with a total yield of 15 Gm. from 8 pounds of drug.

This crystalline glucoside is soluble in alkali hydroxides or carbonates, from which it may be recovered without change by precipitating with dilute hydrochloric acid, washing with water and crystallizing from alcohol. The optical activity and melting point remain the same, which is taken as evidence that it is unchanged. Hydrolysis of the glucoside by acids is very slow and in aqueous suspension requires boiling.

(*2*) *Alcohol-Soluble Glucosidal Material.*—The alcoholic solution from which the crystalline glucoside was separated yielded a non-crystalline product, readily soluble in alcohol, insoluble in chloroform, ether, benzine or benzene, is light yellow in color, m. p. 230–240° $[\alpha]_D$ +37. This product gives the characteristic glucosidal reaction and is not crystallizable from alcohol or hydroalcoholic solutions. Dialysis of the sodium salt was tried with negative result. This product is probably contaminated with the crystallizable glucoside D(1). The yield was 1.9 Gm. from 8 pounds. of drug.

(*3*) *The Constants of the Glucosides* which Power and Salway report, together with those reported above under B (D, 1 and 2) are:

	M. P.	$[\alpha]_D$.	Alcohol.
Caulosaponin (cryst.)	250–255°	...	sparingly soluble
Glucoside D (1) (cryst.)	243–246°	45	sparingly soluble
Caulophyllosaponin (cryst.)	250–260°	32.3	very soluble
Glucoside D (2) (non-cryst.)	230–240°	37	very soluble
Glucoside B (non-cryst.)	210–220°	31.2	very soluble

(*4*) *To investigate further the action of the enzyme* in bringing about the change to crystal form of glucoside, it was assumed the enzyme is present in quantity such that it could produce the change in additional non-crystalline glucoside which might be added to it, and such is the case, as is shown by the following test. One Gm. of the non-crystalline glucoside B was thoroughly mixed with 5 Gm. of drug, then moistened and kept in this condition for about a week. The mixture was then dried, extracted with hot alcohol, reduced to extract and washed with water etc., as described in B, after which it was dried, dissolved in hot alcohol and from this was obtained 0.15 Gm. of sparingly alcohol-soluble, but crystalline, glucoside. No attempt was made to recover more of it since this amount indicates the greater portion came from the non-crystalline product B. The same experiment using the non-crystalline material D(2) resulted only in a non-crystalline product. This suggests that glucosides D(1) and D(2) are products of the ferment-hydrolysis of glucoside B. No attempt has been made as yet to subject B to other hydrolytic agents.

E. Acidic Character of the Glucosides.—The behavior of these glucosides toward alkalies indicates that they are acidic. It does not seem likely that this acid character is due to a phenol since they are freely soluble in sodium carbonate. Sodium bicarbonate, however, reacts very slightly with them in cold aqueous solution.

To show the relative acidity of the three forms of glucosides referred to in B, D(1 and 2), one-tenth Gm. of each was dissolved in warm neutral 70% alcohol and the acidity determined with $N/50$ sodium hydroxide, phenolphthalein indicator. They required respectively 6.25 cc., 6.00 cc. and 6.30 cc. In each case the alkali was increased to 10 cc., the excess determined with $N/50$ sulphuric acid and the acid required equalled the excess alkali added. The increased amount of alkali required for B, and D(2), both of which were not crystallizable, may be due to alcohol soluble saponifiable resins.

F. Extractability of Caulophyllum by Alcoholic Menstrua.—It is possible that a considerable proportion of the Caulophyllum under the ordinary condition of handling would be subject to enzyme action, in which case the comparatively alcohol-insoluble glucoside results.

The menstruum prescribed in the National Formulary for the preparation of the fluidextract consists of alcohol, three volumes, and water, one volume. The fluidextract made from the drug where enzyme action has occurred therefore represents only a small proportion of the glucoside in the drug. If the fluidextract is to be used instead of the isolated active constituents, it would seem advisable to add sodium carbonate to the menstruum to render the glucoside soluble. This does not affect the solubility of the alkaloid, as the base is readily soluble in either water or alcohol.

SUMMARY.

1. Analysis of Caulophyllum by the method (*A*) of Power and Salway yielded the alkaloid methylcytisine and a non-crystalline glucosidal material which differed from that described by them.

2. A modification of the above method (*B*) resulted in a similar non-crystallizable product.

3. By moistening the drug to allow enzyme action previous to extraction, a crystalline glucoside D(1), also a non-crystallizable glucosidal product D(2) was obtained.

4. Power and Salway obtained two crystalline glucosides Caulosaponin and Caulophyllosaponin. The crystalline glucoside obtained after fermentation D(1) by its slight solubility in alcohol and its melting point, resembles caulosaponin, but is optically active, while they do not report on the optical activity of caulosaponin.

The caulophyllosaponin reported by them is optically active, very soluble in alcohol and if present in the fermented drug referred to, it would appear in the glucosidal material reported in D(2), which is optically active but did not crystallize from alcohol or hydroalcoholic solutions.

5. The change in the glucoside to crystal form apparently is due to enzyme action since a portion of the non-crystalline product B when mixed with drug and moistened yielded the crystal form. In other words, enzyme action in the drug affects the character of the glucoside obtained therefrom, namely,

In the absence of enzyme action, only non-crystalline glucoside obtained.

Enzyme action results in crystalline and non-crystalline glucosidal products, which differ also by the degree of their solubility in alcohol.

The pharmacologic actions of the isolated constituents are under investigation and we hope to report on these later.

THE MELTING POINT OF ACETYLSALICYLIC ACID.

BY T. S. CARSWELL.

I. INTRODUCTION.

In a recent article upon the physical constants of acetylsalicylic acid, Hayman, Wagener and Holden (JOUR. A. PH. A. 14, 388–392 (1925)) show that the melting point of the product varies when crystallized from different solvents, although the crystals obtained from different solvents are identical in optical properties and crystal form. They also state that the temperature at which acetylsalicylic acid melts is apparently not a true melting point.

In the course of some work in this laboratory on acetylsalicylic acid, it became apparent that consistent results for the melting point of this substance could be obtained only when the conditions under which the melting point was taken were rigidly standardized. Attention was first given to the rate of heating, and it was found that in order to obtain check results even upon the same sample it was necessary to control the rate of heating by a stop-watch. Even when the rate of heating was carefully controlled, variations in the melting point were noticed which could not be attributed to errors on the part of the manipulator. Crystallizations of the same product from different solvents gave varying melting points, and in this respect checked the observations of Hayman, Wagener and Holden.

A further study of the matter showed that the irregular variations in melting points were due to some physical differences in the crystals, and when the physical differences were eliminated or equalized by grinding the products to a uniform degree of fineness, the irregularities to a large extent disappeared.

Three methods of determining the melting point are at the present time in general use:

(1) The U. S. P. X method in which the sample is inserted in a bath preheated to 120°, and the temperature raised 3° per minute until melting begins, when the rate is lowered to 0.5° per minute;

(2) The method of Dahm (*Ind. Eng. Chem.* 11, 29–30 (1919)), in which the sample is inserted in a bath preheated to 130°, and the temperature raised 1° per minute;

(3) The method of the new German Pharmacopœia, in which the sample is inserted in a bath preheated to 125°, and the temperature raised so that not more than 10 to 15 seconds are required to cause a rise in temperature for each successive degree.

These methods all give different values for the melting point, a result which is to be expected, since practical experience, as well as a study of the literature, leaves no doubt that aspirin melts with decomposition, and that what is really determined is a combination of the true melting point with the decomposition point. The latter has no exact value, but is a function of the time and temperature. The longer the period of heating below the true melting point, the more the observed value approaches a decomposition rather than a melting point. It is interesting to tabulate the approximate melting points by these various methods, together with the time and average temperature of heating.

	Approx. m. p.	Average temp.	Time.
U. S. P. X Method	132°	126°	4
Dahm Method	134°	132°	4
German Pharmacopœia Method	135°	130°	2

It is evident that the nearest approach to the true melting point will be given by the German Pharmacopœia Method while the U. S. P. X will more nearly approach a decomposition point. It must be noted that none of the above methods specifies the fineness to which the sample must be reduced before the determination. The U. S. P. X under general remarks says that the substance shall be reduced to a very fine powder but makes no other specification.

II. EXPERIMENTAL WORK.

High grade samples of commercial aspirin were used as the starting material. The purity as determined by assay according to the U. S. P. X was 99.8 to 99.9%. The data given below are taken from determinations on one sample from one manufacturer, but similar data were obtained upon different samples from different manufacturers. As has been previously stated, the temperature rise in all determinations was held at the specified rate with a stop-watch. The melting point apparatus of Dahm (*loc. cit.*) was used. In taking melting points by the German Pharmacopœia the temperature was raised exactly 5° per minute.

The melting point as given under "unground" was taken by crushing the crystals roughly with a spatula upon a clean piece of cardboard, the value given under "ground" was taken by crushing the crystals in a mortar and passing through a 200-mesh screen. The portion remaining on the screen was crushed and resifted, and the operation repeated until the entire sample passed through the screen.

The starting material gave the following values:

	Not ground.	Ground.
U. S. P. X Method	131.2–132.2	130.8–131.8
Dahm Method	133.0–134.8	132.4–134.0
German Pharmacopœia Method	133.8–135.0	132.8–134.8

After crystallization from chloroform the following values were obtained:

	Not ground.	Ground.
U. S. P. X Method	130.6–132.1	129.7–130.5
Dahm Method	132.4–132.8	131.6–132.7
German Pharmacopœia Method	134.8–136.8	133.2–135.0

It is interesting to note that the crystals from chloroform melted higher than the original product by the method of the German Pharmacopœia, although lower by the U. S. P. and Dahm methods. The latter results agree with those of Hayman, Wagener and Holden who obtained a slightly lower melting point after chloroform crystallization. Allen ("Commercial Organic Analysis," Edition V, Vol. 3, p. 527) states that acetylsalicylic acid recrystallized from benzene or chloroform melted sharply at 136–137°, but he does not give the method by which the melting point was taken. It will be noted that in our experiment the melting point on the "ground" basis dropped to a normal value. Although the experiment we quote here gave us a higher apparent melting point by the method of the German Pharmacopœia, we have also observed cases in which crystallization from chloro-

form gave a lower melting point on the "not ground" basis. Even in these cases, grinding of the product showed a normal melting point.

After crystallization from benzene, the following values were obtained:

	Not ground.	Ground.
U. S. P. X Method	131.6–132.6	130.0–130.6
Dahm Method	133.2–134.0	132.2–133.4
German Pharmacopœia Method	135.6–136.6	133.0–134.9

Crystallization from acetone gave the following values:

	Not ground.	Ground.
U. S. P. X Method	131.0–132.0	131.2–132.0
Dahm Method	132.8–133.8	133.0–134.4
German Pharmacopœia Method	133.0–135.6	133.4–135.2

Crystallization from ethyl alcohol gave the following values:

	Not ground.	Ground.
U. S. P. X Method	130.2–131.6	130.6–131.6
Dahm Method	133.0–135.0	132.6–134.2
German Pharmacopœia Method	134.2–136.0	133.6–135.2

III. DISCUSSION OF RESULTS.

Inspection of the above tables shows that the fineness of the material in the melting point tube greatly influences the observed melting point. The normal effect of increasing fineness is to decrease the melting point. Since this is the case, it is evident that a reliable method for taking the melting point should specify the fineness of the product, and not leave this to chance. The writer believes that a specification should be adopted, requiring grinding to pass 200 mesh. Such a specification will eliminate variations due to crystal size and structure.

The above tables also show that the melting point after grinding, when taken by the method of the German Pharmacopœia, approaches the constant value of 135°, although by the other methods varying results are obtained. Fifteen determinations on different samples of commercial ground acetylsalicylic acid by the method of the Pharmacopœia gave an average final melting point of 135.0°, with maximum variations of ± 0.2°. Determinations of the melting point by the U. S. P. procedure on the same samples (ground to 200 mesh) gave an average final melting point of 131.2, with maximum variations of ± 0.7°.

This data indicates that the method of the German Pharmacopœia gives more nearly the true melting point of acetylsalicylic acid, since it approaches an exact value, reproducible within narrow limits. The method of the U. S. P. X gives a "decomposition point," which is subject to rather wide fluctuations, depending on the external conditions, such as the size of the tube, compactness of the powder and the physical state of the powder.

CONCLUSIONS.

1. The melting point of acetylsalicylic acid is dependent upon the size of the particles in the melting-point tube, and to obtain uniform results grinding to a standard fineness must be adopted.

2. The nearest approach to the true melting point of acetylsalicylic acid is given by the method of the new German Pharmacopœia, after grinding to 200 mesh.

3. Variations in the melting point of acetylsalicylic acid after crystallization from different solvents are caused by differences in the physical structure of the crystals, since grinding to a fine powder gives a uniform melting point.

LABORATORIES,
MONSANTO CHEMICAL WORKS,
ST. LOUIS, MISSOURI.

NITROSYL CHLORIDE AND KETONES.

BY E. V. LYNN AND FRANK ANDREW LEE.

Since the review (1) published more than a year ago, covering the chemical action of nitrosyl chloride, our attention was called to a report (2) of Rheinboldt and Schmitz-Dumont which had appeared but a short time before. They found that certain ketones were converted by this gas into chlorinated isonitroso compounds, R—CO—C(=NOH)Cl. The exact mechanism of this change is not clear, but it is difficult to interpret it in any other way than simple chlorination. Because the intermediate isonitroso compounds could be isolated in some cases and because they could then be converted by further action under the same conditions, producing two molecules of nitric oxide, the authors express the opinion that the reaction proceeds in two steps:

(1) $R—CO—CH_3 + NOCl \longrightarrow R—CO—CH{=}NOH + HCl$
(2) $R—CO—CH{=}NOH + 2NOCl \longrightarrow R—CO—C(=NOH)Cl + 2NO + HCl$

The second stage could be expressed by production of a hypothetical HNO:

$$R—CO—CH{=}NOH + NOCl \longrightarrow R—CO—CH(=NOH)Cl + HNO$$
$$HNO + NOCl \longrightarrow HCl + 2NO$$

Acetone, methyl propyl ketone, methyl isopropyl ketone, pinacoline, levulinic acid, methyl *p*-tolyl ketone, benzal acetone and anisal acetone gave, in this way, chlorisonitroso derivatives, *p*-chloracetophenone and phenylacetone gave merely the isonitroso compound, while anisalacetone yielded both forms. Acetophenone, under the conditions gave no reaction, but vapors of the reagents reacted to give chlorisonitrosoacetophenone. The nitrosyl chloride compound of stannic chloride carried the reaction only as far as the isonitrosoacetophenone.

Our experiments, started some time ago, have led to results which are somewhat at variance with these and which open up a fertile field of investigation. With acetone undiluted, there is an immediate and quiet reaction in the cold to give isonitrosoacetone and phorone, the latter being subsequently converted into mono, and probably a dinitrosochloride. No trace of a chlorinated product could be separated, nor was there any indication of nitric oxide evolution. If, however, the acetone is previously diluted with carbon tetrachloride, the results of Rheinboldt and Schmitz-Dumont are confirmed. It seems rather remarkable that undiluted acetone should react to give less complete action than does the diluted substance, and we are now engaged in studying this phase. The natural supposition would be to attribute this to the fact that the process requires a longer time when the acetone is first dissolved, but our experience indicates that this is by no means a satisfactory explanation.

Another notable result obtained by the German investigators was evidence of oxidation by nitrosyl chloride. Acetophenone boiled with a solution of the gas gave benzoic acid, although there was no indication of action in the cold. We have been unable to bring about oxidation at any temperature below that of the room, even with such good reducing agents as acetaldehyde, benzyl alcohol and benzaldehyde, and the tendency at higher temperatures seems small. These results we will report shortly in connection with work on aldehydes and alcohols.

EXPERIMENTAL.

The nitrosyl chloride used in these experiments was prepared by adding nitrosyl sulfate to sodium chloride and warming to 60° C. The former was made by the method of Girard and Pabst (3), modified by Dr. Waldo Semon, of this school, as follows:

> In a beaker arranged for external cooling and fitted with an efficient mechanical stirrer is mixed 140 cc. of fuming nitric acid (sp. gr. 1.50) and 210 cc. of sulphuric acid (sp. gr. 1.84). There is now added slowly and in small portions, 38 Gm. of freshly dried and sifted flowers of sulphur, the temperature being kept around 40° C. With care neither sulphur dioxide nor nitric oxide will be evolved. The resulting mixture, which usually contains an excess of sulphur may be used directly for the preparation of nitrosyl chloride. If desired it may be stored in glass-stoppered bottles, where it will shortly set to a mass of crystals of nitrosyl sulphuric acid.

Acetone.—The material which was labeled "chemically pure," was dehydrated by refluxing over anhydrous lime and then carefully fractionated, the fraction boiling at 59° C. being selected for treatment. This was cooled to about —10° C. by means of a freezing mixture and a slow stream of nitrosyl chloride passed into it in such a manner that there was no marked rise in temperature. The gas was all absorbed without changing the color of the acetone until a yellow color marked the completion of reaction and indicated an excess of the chloride. During one or two of the experiments, especially at low temperatures, a green color was observed, and blue spots appeared on upper parts of the vessel, indicating the formation of a true nitroso compound. The yellow color became gradually darker on standing until it was almost black at the end of twenty-four hours. The product had a distinctive odor, resembling hydrocyanic acid, but the source of this has not been traced. After standing for a few days crystals separated in the form of thick, colorless prisms, which were found to have a melting point of 175–176° C.

Isonitrosoacetone.—The reaction of nitrosyl chloride and acetone was allowed to proceed to the formation of a yellow color. The solution was evaporated immediately at a low temperature resulting in needle-like crystals of melting point 61° C. In all other properties this substance behaved as isonitrosoacetone (4), melting point 69° C.

Phorone Nitrosochlorides.—The crystals which separated in large quantities from the reacting mixture were found to contain both nitrogen and chlorine. They distilled unchanged and were unaffected by cold sodium hydroxide or by boiling with sulphuric acid, which precluded any oxime character. The oily residue from the reaction of nitrosyl chloride on acetone was fractionally distilled under reduced pressure. That which came over at 52–80° C. (21–100 mm.) deposited crystals on standing, a melting point which showed them to be of the same substance as before.

The easiest method of preparation of the crystalline material is as follows:

Add one Gm. molecule of nitrosyl chloride (calculated from the sulphate) to one of acetone, keeping the latter cool. When the reaction is complete, remove the excess of acetone and hydrochloric acid by direct distillation. Subject the residue to vacuum distillation and set the distillate aside in a freezing mixture. Collect the separated crystals and recrystallize from water.

Analysis for chloride showed that these are probably phorone mononitrosochloride; found 17.30, calculated 17.41 per cent.

In order to confirm this, the substance was converted to phorone. A solution of the chloride was subjected to steam distillation with sodium hydroxide. The oily layer of the distillate was extracted with ether and the latter allowed to evaporate spontaneously. The residue was cooled with a freezing mixture and finally solidified. A melting point of 28–29° and complete absence of nitrogen or chloride, together with the method of preparation left no doubt that this is phorone.

To make this entirely certain, however, an ether solution of phorone was treated with nitrosyl chloride at low temperatures. After a few seconds the mixture became milky and the ether was allowed to evaporate. In a short time crystals were deposited, melting point 168°. After recrystallization from water these melted at 174°. Phorone, therefore, forms a mononitrosochloride.

$$(CH_3)_2C{=}CH{-}CO{-}CH(NO){-}C(Cl)(CH_3)_2$$

If phorone is treated with an excess of nitrosyl chloride, the primary milky solution clears up and becomes yellow. The same result is obtained if crystals of the mononitrosochloride are treated with the gas. Evaporation of the yellow solution leaves an uncrystallizable yellow oil, which gradually resinifies. The probabilities are that this is the dinitrosochloride.

$$(CH_3)_2C(NO){-}CH(Cl){-}CO{-}CH(Cl){-}C(NO)(CH_3)_2$$

Methyl Ethyl Ketone.—The material was prepared by fractionation from a stock bottle of pure substance. That boiling at 81° was selected for treatment. Nitrosyl chloride was run in at —5° to —10° C. until a yellow color was apparent, when the excess of ketone was removed by distillation under reduced pressure. On cooling the brown residue, it partially solidified. After recrystallization several times from chloroform, the product was nearly white and exhibited a melting point of 70–74° C., which indicates the compound as isonitroso methyl ethyl ketone:

$$CH_3{-}CH_2{-}CO{-}CH{-}NOH$$

Di-n-Propyl Ketone.—This compound was prepared by distilling dry calcium *n*-butyrate and fractionating the product at 145° C. In carbon tetrachloride solution, nitrosyl chloride had apparently no action on the ketone, since all of the latter was recovered unchanged. When one molecule of the liquid chloride was added to the undiluted ketone, there was a gradual disappearance of the dark red color, an evidence of reaction. The product was distilled in a vacuum up to 150° C. at 80 mm. The oily residue was converted to an oxime by hydroxylamine in the usual way, yielding white crystals with a melting point of 165° C. The product is, therefore, isonitroso di-*n*-propylketone, whose oxime melts at 167° C:

$$CH_3CH_2{-}CH_2{-}CO{-}C(NOH)CH_2CH_3$$

No trace of a chlorine compound could be isolated.

CONCLUSIONS.

It is evident that dialkyl ketones or alkyl aryl ketones generally react readily with chloride to form isonitroso compounds, with substitution in alpha position to the carbonyl group.

$$R—CO—CH_2R' \longrightarrow R—CO—C(=NOH)R'$$

Since reaction on paraffin hydrocarbons (5, 6) proceeds but very slowly and only by catalysis from certain wave-lengths of light, we can definitely conclude that presence of a carbonyl group greatly stimulates the reactivity of hydrogen in neighboring position. When R′ is hydrogen, it then becomes labile enough, under certain conditions, to become chlorinated by the nitrosyl chloride.

$$R—CO—CH=NOH \quad R—CO—C(Cl)=NOH$$

Evidences for oxidizing properties of nitrosyl chloride were found by Rheinboldt and Schmitz-Dumont, but such a reaction seems improbable under anything but unusual conditions.

SUMMARY.

1. Acetone reacts under varying circumstances to give isonitroso acetone, chlorisonitrosoacetone, phorone mononitrosochloride, and probably phorone dinitrosochloride.

2. Methyl ethyl ketone gives the corresponding isonitroso compound.

3. Di-*n*-propylketone gives an isonitroso compound.

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COLLEGE OF PHARMACY,
UNIVERSITY OF WASHINGTON,
SEATTLE, WASHINGTON,
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SHORTAGE OF PHYSICIANS IN RURAL DISTRICTS DISCUSSED.

One of the outstanding problems considered at the conference of the Council on Medical Education and Hospitals of the American Medical Association, held at Chicago, February 14th to 16th, inclusive, was the shortage of general medical practitioners in rural towns and districts throughout the country which, it is said, has resulted from the mounting cost and higher standards of medical education in the United States.

LEPROSARIUM URGED ON ISLAND OF CULION.

Consideration is being given by the Government to bills in the Senate which provide for a leprosarium on the Island of Culion. The measure authorizes the expenditure of $4,000,000 for the site and construction of buildings and maintenance. There are said to be nearly 6000 lepers on the Island, representing about one-half the number in the Philippine Islands.

A REVISION OF THE PENTANOLS.

BY S. M. GORDON.

(*Continued from p. 224.*)

THE INDIVIDUAL ALCOHOLS.

1. Pentanol-1. $CH_3CH_2CH_2CH_2CH_2OH$.

Synonyms.—α-oxy-pentane
Butyl carbinol
Primary normal amyl alcohol
Normal amyl alcohol

History.—In 1871, Lieben and Rossi (*Ann.*, 159, 70 (1871)) prepared normal valerianic acid for the first time, by the hydrolysis of *n*-butyl cyanide. The acid was converted to the aldehyde by dry distillation with calcium formate. The aldehyde was then reduced by sodium amalgam and H_2SO_4 (cp. Lieben and Rossi, *Ann.*, 158, 150 (1871)) to the corresponding alcohol, pentanol-1. The constitution of the body follows from the method of preparation.

Methods of Formation.—*a.* By reduction of *n*-valeric aldehyde with sodium amalgam (Lieben and Rossi, *Ann.*, 159, 70 (1871)).

b. By reduction of ethyl valerate with sodium ethylate (Bouevalt and Blanc, French Pat. through *Central*, 76, 2, 1700 (1905)).

c. By treating *n-p*-amyl amine with nitrous acid (Gartenmeister, *Ann.*, 233, 253 (1886)).

Preparation.—Reduction of ethyl *n*-valerate with sodium gives 56–61% of the alcohol (Adams, Kamm and Marvel, *Univ. of Illinois Bull.*, Vol. 18, No. 6, p. 54 (Oct. 11, 1920)).

Occurrence.—Small amounts result from the action of bacillus butylicus on glycerol (Morin, *Bull. de Soc. Chem.* (2), 48, 803 (1887)).

In the "yellow oil" from butyl alcohol fermentation of starch (Marvel and Broderick, *J. A. C. S.*, 47, 3045 (1925)).

Identification.—Being a primary alcohol it would be expected that the compound might be identified by oxidation to the corresponding aldehyde and hence preparation of an oxime or semicarbazone. A survey of the literature, however, shows that no report has been made on the preparation of an aldehyde by oxidation from this alcohol. However, the aldehyde prepared in a different manner yields an oxime of m. p. 52° (Blaise, *Compt. rend.*, 138, 698 (1904)). No record of the semicarbazone has been found. Complete oxidation would lead to the acid, which could be converted into a silver salt and thus identified. This has been done by Fournier (*Bull. de Soc. Chem.* (4), 5, 923 (1909)), but the inherent difficulty of this method is that it does not distinguish between the four isomeric primary pentanols, as each would be oxidized to an acid and all having the same molecular weight. Hence other methods were adopted.

The earliest method thus used was interaction with phenyl isocyanate to yield the corresponding phenyl urethane. The melting point of the phenyl urethane is given as 46° C. by Blaise and Picard (*Ann. Chem. et Phys.* (8), 25, 261 (1912)).

Analogous to phenyl isocyanate is α-naphthyl isocyanate. This reacts more readily than the phenyl compound, hence has come in great favor for identification

of the alcohols. The α-naphthyl urethane of normal amyl alcohol melts at 66–67° (see chapter on α-naphthyl urethanes).

The 3.5-dinitro-benzoate of normal primary amyl alcohol melts at 45° C. (see chapter on 3.5-dinitro-benzoates).

The 3-nitro-phthalic acid ester melts at 133° (Marvel and Broderick, *J. A. C. S.*, 47, 3045 (1925); cp. chapter on 3-nitro-phthalates).

2. Methyl-2-butanol-1. $CH_3CH_2\overset{*}{C}H\,CH_2OH$, with CH_3 as a branch on the starred carbon.

Synonyms.—Secondary butyl carbinol
Methyl ethyl carbin carbinol
Active amyl alcohol
Dextrogyrate amyl alcohol

History.—Secondary butyl carbinol is an essential constituent of fusel oil, which was recognized by Scheele in 1785. That a body having the power of rotating the plane of polarized light was present in fusel oil was early recognized by Biot (*Compt. rend.*, 41, 296 (1855)). Pasteur (*Compt. rend.* 41, 296 (1855)), found that the degree of rotation of the fusel oils depended on the source. This led him to believe that the amount of the active constituent depended on the conditions of formation. He further showed that the optically active body could be separated from the inactive body accompanying it in fusel oils by the formation of the amyl sulphuric esters, which could then be separated by repeated fractional crystallization of the barium salts, subsequently formed. In a critical study of the separation of the constituents of fusel oil Marckwald (*Ber.*, 34, 479 (1901); 35, 1598 (1902); 37, 1039 (1904)), confirmed the results of Pasteur and placed the chemical separation of the 2-methyl-butanol-1 and 2-methyl-butanol-4 on a satisfactory basis. Marckwald used the method devised by Le Bel (*Compt. rend.*, 77, 104 (1873)), and the formation of the 3-nitro-acid phthalates to separate these isomers. Later, F. Ehrlich (*Ber.*, 40, 1035 and 2251 (1907)) showed that isoleucine, when acted on by yeast in the presence of cane sugar yielded the alcohol in question—in quantitative yields. Further investigations showed that the amount of methyl-2-butanol-1 and methyl-3-butanol-1 in fusel oil from molasses spirit depended on the amount of isoleucine (3-methyl-2-amino pentane acid 1) and leucine originally present. This led to the amino-acid theory for the formation of the amyl alcohols. That is the alcohols are presumed to form according to the following scheme:

$$CH_3CH_2CH(CH_3)CH(NH_2)COOH \xrightarrow{HOH} CH_3CH_2CH(CH_3)CHOHCOOH + NH_3$$

$$CH_3CH_2CH(CH_3)CHOHCOOH \xrightarrow{-CO_2} CH_3CH_2CH(CH_3)CH_2OH$$

Methods of Formation.—*a.* From isoleucine by yeast in the presence of cane sugar (Ehrlich, *Ber.* 40, 2251 (1907)).

b. By reduction of tiglic aldehyde by iron and acetic acid. (Lieben and Zeissel, *Monats.*, 7, 60 (1886).)

$$CH_3CH=C(CH_3)-CHO \xrightarrow{H_2} CH_3CH_2CH(CH_3)CH_2OH$$

c. By treating 2-bromo-butane with magnesium and formaldehyde (Freundler, *Bull. de Soc. Chim.* (3) 35, 110 (1906)). Methods *b* and *c* yield inactive mixtures.

Preparation.—A. By separation from fusel oil.

1. The barium salts of the acid sulphuric esters are prepared and separated by fractional crystallization. The alcohol is regenerated from the barium salt by dilute sulphuric acid (Pasteur, *loc. cit.;* Marckwald, *loc. cit.*).

2. The mixture of alcohols is esterified with dry HCl gas. The inactive form (2-methyl-butanol-4) is more readily attacked. The chloride of the active form is separated by distillation. Repetition of the process gives an alcohol of high rotation, but not an absolutely pure product (Le Bel, *loc. cit.;* also Plimpton, *J. A. C. S.*, 39, 332 (1881); Guye, *Ann. chim. phys.* (6) 25, 174 (1892)).

3. The mixture of alcohols is esterified with 3-nitro-phthalic acid and the resultant acid phthalates separated by fractional crystallization. The esters are then saponified with dilute alkali. This method gives a very pure product (Marckwald and McKenzie, *Ber.*, 34, 485 (1901), and 37, 1039 (1904)).

B. By synthesis.

2-Bromo-butane with formaldehyde by Grignard's reaction gives 73% of the inactive form (Freundler, *loc. cit.*).

Occurrence.—Methyl-2-butanol-1 is found in:

a. Potato and grain fusel oil (Marckwald, *Ber.*, 34, 479 (1901)).

b. In corn fusel oil (Rudakow, *Central*, 1, 1481 (1904)).

c. In molasses spirit (Ehrlich, *loc. cit.*, and Kaillan, *Monats.*, 24, 533 (1903)).

d. In "yellow oil" from butyl alcohol fermentation (Marvel and Broderick, *J. A. C. S.*, 47, 1034 (1925)).

Identification.—Secondary butyl carbinol being a primary alcohol, hence on oxidation it would be expected to yield the corresponding aldehyde and acid, which could then be identified either by the usual methods for aldehydes and acids, respectively. But F. Ehrlich (*Ber.*, 40, 2556 (1907)), has shown that careful oxidation leads to a very low yield of the corresponding aldehyde. The optically active aldehyde does not form an oxime, but the inactive form yields a liquid oxime of b. p. 149–151° (Neustadter, *Monats.*, 27, 1884 (1906)). The semicarbazone prepared from the aldehyde melts at 103° C. (Sommelet, *Bull. de Soc. Chem.* (4), 1, 406 (1907)).

Complete oxidation to the acid must be carried out with great care. Marckwald (*Ber.*, 37, 1045 (1904)) and Lieben and Zeissel (*Monats.*, 7, 60 (1886)), obtained different results, both using $K_2Cr_2O_7$ and H_2SO_4. Marckwald was able to identify only the corresponding acid, while the latter workers obtained not only the acid corresponding to that alcohol but also HCOOH and $CH_3COCH_2CH_3$. Hence more satisfactory methods than the older ones are advisable.

These were found in such crystalline derivatives as the phenyl urethanes, α-naphthyl urethanes, 3.5-dinitro-benzoic acid esters and the 3-nitro-phthalic acid esters. The properties of the compounds were redetermined as part of this investigation.

Phenyl urethane of the active form m. p. 30°, of the inactive form m. p. 31° (Marckwald, *Ber.*, 37, 1049 (1904).

α-Naphthyl urethane, m. p. 82° (Neuberg and Kansky, *Biochem. Z.*, 20, 445 (1909)).

3.5-Dinitro-benzoate, m. p. 83–84° (see chapter on 3.5-dinitrobenzoates).

3-Nitro-phthalic-acid ester, m. p. 159° (Nicollet and Sacks, *J. A. C. S.*, 47, 2384 (1925); also see chapter on 3-nitro-acid-phthalates of this report).

3. Methyl-3-butanol-1 $CH_3CH(CH_3)CH_2CH_2OH$

Synonyms.— Isobutyl carbinol
Primary isoamyl alcohol
Isoamyl alcohol
Fermentation amyl alcohol

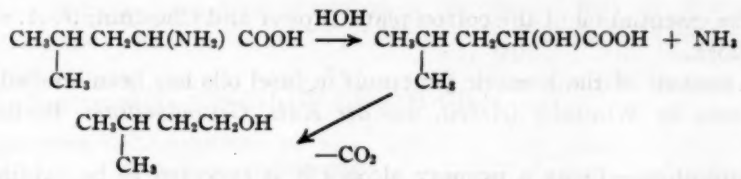
History.—Methyl-3-butanol-1 is closely connected with methyl-2-butanol-1. It is the chief constituent of the fusel oils. It occurs with its isomer, optically active amyl alcohol in all the fusel oils thus far investigated. The fusel oil of which this is the chief constituent was recognized as early as 1775 by Scheele in the "Nachlauf" of spirit distillation. The properties of a constant boiling fraction of fusel oil of boiling point 130–132° was investigated by Dumas, Cohours and others (see introduction). As a result of these investigations, it was found that the constant boiling portion had the formula $C_5H_{12}O$ and belonged to the series of alcohols of which ethyl alcohol was the chief member. Biot (*Compt. rend.*, 41, 295 (1855)), later showed that the "alcohol" thus isolated rotated the plane of polarized light. With the advent of the asymmetric carbon theory of Van't Hoff and Le Bel (1874), it was assumed that the mixture of alcohols must contain one with an asymmetric carbon atom. Pasteur, earlier (*Compt. rend.*, 41, 296 (1855)), found that the degree of rotation of the "alcohol" depended on the source of the fusel oil. From now on the question of the existence of this alcohol is closely linked with that of its isomer. Studies by Pasteur, Le Bel and critical studies of Marckwald showed methods for the separation of this alcohol from its accompanying isomer by fractional crystallization of the barium salts of ethyl sulphuric acid, of the 3-nitro-acid phthalates and by rate of esterification with hydrochloric acid gas.

The formula assigned to the alcohol was confirmed by synthesis of the alcohol from isopropyl carbinol by the following reactions (Erlenmeyer, *Ann. sup.*, 5, 337 (1867)).

$$CH_3CH(CH_3)CH_2OH \xrightarrow{PBr_3} CH_3CH(CH_3)CH_2Br \xrightarrow{KCN} CH_3CH(CH_3)CH_2CN \xrightarrow{HOH}$$

$$CH_3CH(CH_3)CH_2COOH \xrightarrow{(HCOO)_2Ca} CH_3CH(CH_3)CH_2CHO \xrightarrow{H} CH_3CH(CH_3)CH_2CH_2OH$$

F. Ehrlich (*Ber.*, 40, 1035 and 2251 (1907)) showed that this alcohol could be derived from leucine; methyl-4-amino-2-pentane acid (5), by the action of yeast in a sugar medium. This led to the amino-acid theory of amyl alcohol formation. This would be expressed as follows:



Derivatives prepared from "amyl alcohol," that is a mixture of the two isomers have unfortunately been designated as amyl alcohol derivatives. Hence there appears to be a vital need to revise the constants in this regard. Many of the physical properties thus listed in the literature are not trustworthy.

Formation.—a. See under history.

b. From leucine (Ehrlich, *loc. cit.;* and Pringsheim, *Biochem. Z.*, 8, 128 (1908)).

c. Reduction of the aldehyde:

1. By sodium amalgam (Friedel, *Ann.*, 124, 326 (1862)).
2. By calcium hydroxide (Fittig, *Ann.*, 114, 66 (1860)).

Preparation.—I. *From fusel oils:*

a. By fractional crystallization of the barium salts of amyl suphuric acids (Marckwald, *Ber.*, 34, 479 (1901); 35, 1598 (1902) and 37, 1039 (1904)).

b. By esterification with HCl (see under preparation of 2-methyl butanol-1).

c. By esterification with 3-nitro-phthalic acid (see under preparation of 2-methyl-butanol-1).

II. From leucine (Ehrlich, *loc. cit.*).

III. By synthesis.

From methyl-2-chloro-3-pentane with Grignard's reagent and polymethylene in 50% yields (Locquin, *Bull. de Soc. Chem.* (3), 31, 599 (1904)).

Occurrence.—In fusel oils of different origins (Marckwald, *Ber.*, 34, 479 (1901)).

In acorn (Rudikow and Alexandrow, *J. Russ. Phys.-Chem. Ges.*, 36, 207 (1904); through *Central*, 75, 1481 (1904)).

In molasses spirit (Ehrlich, *Ber.*, 40, 1044 (1907)).

In wood-tar oil (formation and analysis of acetyl and benzoyl esters) (Looft, *Ann.*, 275, 369 (1893)).

As an ester in Roman chamomile oil (*Anthemis nobilis*) saponification and preparation of the phenyl urethane (Blaise, *Bull. soc. chim.* (3), 29, 329 (1903)).

In *Eucalyptus globulus* and *Eucalyptus amydalina* oils (Bouchardat, *Bull. soc. chim.* (3), 9, 429 (1893)).

In Grasse peppermint oils, oxidation to the acid (Roure Bertand, Fils. *Reports*, (2), 9, 29 (1909)).

In American peppermint oil (Power and Kleber, *Pharm. Rund.*, 12, 157 (1894)).

In Valencia orange oil, oxidation and analysis of the silver salt (Hall and Wilson, *J. A. C. S.*, 47, 2575 (1925)).

In Lavender oils, b. p. 129–133° and phenylurethane, m. p. 39–41°, "Gildermeister-Hoffmann, Die Aetherische Oele," Vol. 3, 439.

In the "yellow oil" from butyl alcohol fermentation (Marvel and Broderick, *J. A. C. S.*, 47, 3045 (1925)).

In the essential oil of the cotton plant (Power and Chestnut, *J. A. C. S.*, 47, 1751 (1925)).

The amount of the isomeric pentanols in fusel oils has been studied in more recent times by Windisch (*Arbeit. aus der Kais. Gesundheitsam*, Berlin, 8, 214 (1894)).

Identification.—Being a primary alcohol it is expected to be oxidized either to the corresponding aldehyde or acid. Oxidation with chromic acid mixture leads to the formation of both the acid and the aldehyde. The aldehyde has been prepared by Tollens (*Ber.*, 36, 1342 (1903)) and by Kohn (*Monatsh.*, 17, 127 (1896)). It gives a liquid oxime of boiling point 161° C. (Cihlor, *Monatsh.*, 25, 158 (1904)).

Oxidation with $KMnO_4$ in alkaline solution leads to the acid (Fournier, *Compt. rend.* 144, 333 (1907)). This can then be converted into the corresponding silver salt and analyzed.

The crystalline derivatives which have been prepared and may be used for identification are herewith reported.

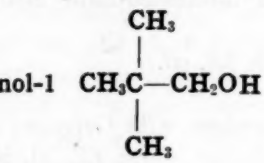
Phenyl-urethane, m. p. 55° (Marckwald, *Ber.*, 37, 1049 (1904)).

α-Naphthyl urethane, m. p. 67–68° (Neuberg and Kansky, *Biochem. Z.*, 20, 445 (1909)), m. p. 61° (see chapter on α-naphthyl-urethanes).

3,5-Dinitro-benzoate, m. p. 61° (see chapter on 3,5-dinitro-benzoate).

3-Nitro phthalic acid ester, m. p. 164° (Nicollet and Sacks, *J. A. C. S.*, 47, 2348 (1925); also see chapter on 3-nitro-phthalic acid esters).

4. Dimethyl-2,2-propanol-1



Synonyms.—2,2-Dimethyl-propanol-1
Tertiary-butyl-carbinol
Tertiary-primary-amyl-alcohol

History.—Relatively little is known of the properties of this alcohol. It was first prepared by Tissier (*A. Ch.* (6), 29, 340 (1893)), and its oxidation products studied. The best yield obtainable has been 4% (Samec, *Ann.*, 351, 256 (1907)). It is the only solid pentanol known (m. p. 48° C.).

Formation and Preparation.—*a.* Reduction of a mixture of trimethyl acetic acid chloride and trimethyl acetic acid with sodium amalgam (Tissier, *loc. cit.*).

b. Reduction of trimethyl acetaldehyde with sodium (Tissier, *loc. cit.*).

c. The action of sodium ethylate on trimethyl acetamide (Scheuble, *Monatsh.*, 25, 1099 (1904)).

d. By Grignard's reaction, magnesium and paraformaldehyde on tertiary butyl bromide (yields, 4%) (Samec, *Ann.*, 351, 256 (1907)).

Oxidation.—Oxidation of the alcohol with dichromate mixture gives a mixture of trimethylacetaldehyde, methyl-isopropyl-carbinol, and trimethyl-acetic-acid (Tissier, *loc. cit.*; cp. Samec, *loc. cit.*).

Occurrence.—This alcohol has not been reported in either the animal or vegetable kingdom.

Identification.—No solid derivatives of this alcohol are described in the literature.

The aldehyde formed by oxidation of the alcohol may be identified as the semi-carbazone; which melts at 192° C. (Bouevalt, *Bull. de Soc. Chem.* (3), 31, 1326 (1904)).

5. Pentan-ol-2 $CH_3CH_2CH_2\overset{*}{C}H(OH)CH_3$.

Synonyms.—β-Oxy-pentane
Methyl-propyl-carbinol
Secondary normal amyl alcohol

History.—This alcohol was first prepared by Wurtz (*Ann.*, 148, 132 (1868)), by acting upon iodo-2-pentane with silver acetate and hydrolyzing the resultant ester with caustic potash. The constitution of the alcohol follows from the method of formation.

The alcohol contains an asymmetric carbon atom hence is expected to exist in two forms. Very little is known of the optically active isomers. Only one attempt at resolution appears in the literature. Le Bel (*Jahrs. ueber Fort. der Chem.*, 492 (1879)), found that *Pencilium glaucum*, developed in the racemic mixture attacked only the dextrogyrate form. The resultant alcohol showed a rotation of —12° 33′ in a 22-cm. tube.

The speed of esterification of this alcohol with trichloracetic acid was studied by Michael and Wolgast (*Ber.*, 42, 3166 (1909)), who found its rate of esterification was in agreement with the secondary alcohol nature of the compound.

Methods of Formation.—*a.* $CH_3CH_2CH_2CHICH_3 + AgOCOCH_3 \xrightarrow{KOH} CH_3CH_2CH_2CHOCOCH_3CH_3 \longrightarrow CH_3CH_2CH_2CHOHCH_3$ (Wurtz, *Ann.*, 148, 132 (1868)), and Bulohoubek (*Ber.*, 9, 925 (1876)).

b. $CH_3CH_2CH_2CHICH_3 + Pb(OH)_2 \longrightarrow CH_3CH_2CH_2CHOHCH_3$ (Wagner, *Ann.*, 179, 319 (1875)).

c. 1. $CH_3CH_2CH_2COCH_3 + (NaHg)x \longrightarrow CH_3CH_2CH_2CHOHCH_3$ (Friedel, *Jahrs. ueber Fort. der Chem.*, p. 513 (1869); Clarke, *Am. Chem. J.*, 39, 90 (1908)).

2. $CH_3CH_2CH_2COCH_3 + H_2(Ni) \longrightarrow CH_3CH_2CH_2CHOHCH_3$ (Sabatier and Senderens, *Compt. rend.*, 137, 302 (1903)).

From CH_3MgI and normal butyric aldehyde. (Unpublished notes, Research Laboratory, Eastman Kodak Co.)

Identification.—As is well known secondary alcohols on oxidation yield the corresponding ketones, which could be isolated and identified as oximes, hydrazones or semi-carbazones, etc.

Oxidation of the alcohol with alkaline $KMnO_4$ yields not only the corresponding ketones, but also acetic and propionic acids (Wurtz, *Ann.*, 148, 133 (1868)). The ketone forms a liquid oxime (Trapesonzjanz, *Ber.*, 26, 1433 (1893)), which boils at 167° C.; and a semicarbazone melting at 100° (Scholtz, *Ber.*, 29, 611 (1896)).

However when diethyl carbinol is oxidized with $K_2Cr_2O_7$ and H_2SO_4 not only does diethyl ketone form, but the ketone corresponding to the alcohol under discussion is also formed. The authors, however, do not state the yield obtained (Wagner and Saizew, *Ann.*, 179, 332 (1875)).

No record of any solid derivatives of this alcohol appears in the literature. The following solid derivatives have been prepared and characterized.

The phenyl-urethane melts at 34°.

The α-naphthyl-urethane melts at 76°.

The 3,5-dinitro-benzoate melts at 60°.

The 3-nitro-acid-phthalate melts at 102–103°.

6. Pentanol-3 $CH_3CH_2CH(OH)CH_2CH_3$.

Synonyms.—γ-Oxy-pentane
Diethyl carbinol

History.—The preparation of this compound was undertaken by Wagner and Saizew in 1875 (*Ann.*, 175, 351) to complete the series of alcohols of the formula $C_5H_{12}O$ as required by Kolbe's theory (see general part). Then, only five of the eight required alcohols were known. The history of the isomeric pentanols up to this time is well reviewed by Wagner and Saizew (*Ann.*, 175, 351 (1875).

Methods of Formation.—a. Ethyl formate is acted upon by zinc and ethyl iodide and the resulting product hydrolyzed (Wagner and Saizew, *loc. cit.*).

b. Action of ethyl magnesium iodide on ethyl formate and hydrolysis of the resultant product (Grignard, *Compt. rend.*, 132, 336 (1901)).

c. By reduction of the corresponding ketone (Sabatier and Senderens, *Compt. rend.*, 137, 302 (1903)) and Ponzio (*Gazz. Chim. Ital.*, 31, 404 (1901)).

Preparation.—The compound is most readily prepared by Grignard's reaction. See *b* under formation.

Occurrence.—Diethyl carbinol has not yet been found in either the animal or vegetable kingdom.

Identification.—Oxidation of the alcohol with $K_2Cr_2O_7$ and H_2SO_4 forms diethyl ketone, propyl methyl ketone, propionic and acetic acids (Wagner and Saizew, *loc. cit.*). The ketone forms an oxime boiling at 162° C. (Scholl, *Ber.*, 21, 509 (1888)). The semicarbazone prepared from the ketone melts at 139° C. (Mannich and Zernik, *Arch. Pharm.*, 246, 180 (1904)).

The phenyl urethane has been prepared by Mannich and Zernik. They report a melting point of 48–49° C. but repeated attempts to confirm this give liquid products only.

The α-naphthyl urethane has been prepared by Neuberg and Kansky (*Biochem. Z.*, 20, 445 (1909)). Melting point is 76–79° C. The melting point found from a preparation of Eastman's diethyl carbinol is 61–62° (see chapter on α-naphthyl urethanes).

The 3,5-dinitro-benzoate melts at 58° C. (see chapter on the 3,5-dinitro-benzoates).

The 3-nitro-acid-phthalate melts at 91° C. (see chapter on 3-nitro-acid-phthalates).

7. 2-Methyl-butanol-3 $CH_3CH\begin{matrix}CHOHCH_3\\|\\CH_3\end{matrix}$

Synonyms.—Methyl-isopropyl-carbinol
Secondary isoamyl alcohol

History.—While this alcohol was predicted by Kolbe in 1856, it was not until Münch's synthesis in 1875 that this was accomplished (Münch, *Ann.*, 180, 339 (1876)). The first report in which this alcohol was mentioned dealt with the forma-

tion of the ketone, but in order to prove the constitution of this body, reduction was effected.

The alcohol contains an asymmetric carbon atom, but no investigations at attempted separations are reported in the literature. When speaking of optically active amyl alcohol, reference is made to methyl-3-butanol-1 already described.

Formation.—*a.* Reduction of methyl-2-butanone-3 with sodium amalgam (Münich, *Ann.*, 180, 339 (1876)).

b. Reaction of nitrous acid on 2-methyl-3-amino butane (Trasciatti, *Gazz. Chim. Ital.* 29, 98 (1899)).

c. Action of methyl magnesium bromide on monochloro acetylchloride (Henry, *Compt. rend.*, 145, 24 (1907)).

d. Action of methyl magnesium bromide on dichloracetone (Henry, *Loc. cit.*).

Occurrence.—This alcohol has not been found in either the animal or vegetable kingdom.

Identification.—Being a secondary alcohol, the body on oxidation should yield the corresponding ketone, which might then be identified either in the form of its oxime, semicarbazone or suitable hydrazone. But oxidation does not stop at the corresponding ketone. Wischnegradski (*Ann.*, 190, 339 (1878)), found that when 2-methyl-butanol-3 was oxidized with $K_2Cr_2O_7$ and H_2SO_4 the following bodies were obtained: Carbon dioxide, acetic acid, acetone and 2-methyl-butanone-3. The ketone forms a liquid oxime of b. p. 157–158° (Nageli, *Ber.*, 16, 2984 (1883)). The semicarbazone melts at 110° C. (Trasciatti, *Gazz. Chim. Ital.*, 29, 2, 100 (1899)).

Other solid derivatives such as the phenyl and α-naphthyl urethanes, 3,5-dinitro-benzoate and 3-nitro-acid-phthalate are not described in the literature.

8. 2-Methyl-butanol-2 $CH_3CH_2\overset{\overset{OH}{|}}{C}—CH_3$ ($\overset{|}{CH_3}$)

Synonyms.— Dimethyl-ethyl-carbinol
Tertiary-amyl-alcohol
Amylene-hydrate
Amylum-hydratum

History.—The alcohol was first prepared by Papow in 1868 (*Ann.*, 145, 292). It has come into therapeutic use because of its sedative properties, for which relatively large quantities are being made.

Formation.—*a.* Action of zinc dimethyl on propionyl chloride (*Ann.*, 145, 292 (1868)).

b. Action of $ZnCl_2$ on amylene (*Bull. soc. chim.* (3), 7, 577 (1892)).

c. Action of methyl magnesium bromide on diethylidene oxide (Henry, *Compt. rend.*, 145, 406 (1907)).

d. Action of $AgNO_2$ on dimethyl 2,2-amino-3-propane (Freunde and Lenze, *Ber.*, 24, 2519 (1891)).

Preparation.—The alcohol may be obtained in 76–79% yields by hydrating amylene in the presence of H_2SO_4 (Adams, Kamm and Marvel, *Illinois Univ. Bull.*, 16 (June 23, 1919)).

Occurrence.—This alcohol has not yet been found in either the animal or vegetable kingdom.

The velocity of esterification with trichloracetic acid has been studied by Michael and Wolgast (*Ber.*, 42, 3167 (1909)).

Identification.—Tertiary alcohols on oxidation decompose to yield compounds with a lesser number of carbon atoms. Tertiary amyl alcohol when oxidized with $K_2Cr_2O_7$ and H_2SO_4 yields acetone and acetic acid (Wischnegradski, *Ann.*, 190, 335 (1878)).

The solid derivatives which may be used for the identification of this alcohol are here listed.

The phenyl urethane melts at 42° C. (Lambling, *Bull. de Soc. Chim.* (3), 19, 777 (1898)). A redetermination gives 45° as the melting point (see chapter on phenyl urethanes).

The α-naphthyl urethanes melt at 71–72° (Neuberg and Kansky, *Biochem. Z.*, 20, 445 (1909)).

The 3,5-dinitrobenzoate melts at 91° C. (see chapter on 3,5-dinitro-benzoates).

The 3-nitro-acid phthalate has not yet been prepared. Attempts to prepare the ester result in the decomposition of the tertiary alcohol, and formation of 3-nitro-phthalic acid.

(*To be continued*)

A HOSPITAL INFLUENZA RESEARCH DEPARTMENT.

The Research Department of St. George's Hospital, Hyde Park, London, is making arrangements to inaugurate a special department for the study of the aetiology of influenza, its incidence and methods of prevention. The research work is to begin at once, so that material and evidence can be collected from the current epidemic. One of the earliest efforts will be directed towards the discovery of the causation of influenza, which has not been definitely made, notwithstanding the theories on the subject. Laboratory accommodation has been provided at the hospital for the new department, the cost of which is likely to run to more than £2000 a year.

WEIGHTS AND MEASURE LAWS ARE COMPILED.

The Bureau of Standards has announced the forthcoming publication of a new compilation of the weights and measures laws of the Federal, State and territorial governments, and has requested that all who wish copies communicate at once making their requests, as it is intended to print only one edition to fill the requirements indicated.

FIRST AID WEEK PUBLICITY.

Retail pharmacists have strongly approved the fine publicity work for pharmacy which many wholesale druggists and manufacturers have put over. At the recent meetings of pharmacists of Minnesota and Iowa, retailers extended thanks for what has been done along this line and urged more similar publicity.

The interest shown during the past month evidences what may be done by coöperation among all divisions of the drug trade.

VITAMIN D.

Scientists here and in Europe, working in more or less collaboration on the problem, have come to the same conclusion, according to Dr. Alfred F. Hess, of the College of Physicians and Surgeons at Columbia University, that the anti-rachitic vitamin D is formed when certain sterols are exposed to ultra-violet light. Dr. Hess and Drs. O. Rosenheim and T. A. Webster, of the National Institute for Medical Research in London, have collaborated with Professor A. Windaus, of Göttingen University, in Germany, who has been engaged in research on the chemical problems involved in the isolation of the anti-rachitic vitamin for several years.

BIBLIOGRAPHY OF PHARMACEUTICAL RESEARCH

Compiled by A. G. DuMez, Reporter on the Progress of Pharmacy.

All articles in these lists will be presented in abstract form in the bound volumes of the YEAR BOOK, which is issued annually. Those desiring abstracts immediately can obtain them for a fee of one dollar each by communicating with A. G. DuMez, University of Maryland, School of Pharmacy, N. E. Cor. Lombard and Greene Sts., Baltimore, Md.

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PHARMACEUTICAL BIBLIOGRAPHY—A SUGGESTION AND AN ILLUSTRATION.*

BY EDWARD KREMERS.

In the March 1921 number of THIS JOURNAL, its editor published a free translation of the Polish editor Tugendhold's article on "The need of an international bibliography of pharmaceutical literature." The plan is a magnificent one. Its greatest failing, however, is that it suffers from a sort of pharmaceutical empirialism. Whereas some empirialistic plans in world politics, unfortunately, succeed temporarily only to collapse ultimately in themselves, this scheme of a pharmaceutical empirialism will, no doubt, fail even before an attempt has been made to try it out.

Of late so much has been orated about scientific research that one hesitates to use the word, lest one be found guilty of popular oratory. Even the *London Times*, in an editorial on national organization and international superorganization, pointed out recently that the scientific politicians, who spout at national and international gatherings, do not at all represent the real investigators.

Whereas research, in its best sense, is highly individualistic, there are other fields of activity in which the individual can accomplish almost nothing or, at best, but little. Not but that coöperation among investigators in the same science, or, better still, among investigators in different sciences, is absolutely essential; the best results, however, are more likely to be attained by voluntary coöperation and not by a machine-like coöperation on part of the members of a given organization.

In the bibliographic field, however, the situation is different. In this line of activity it has become practically impossible to master the progress made year in and year out in but a single science. Furthermore, such an undertaking is frequently a waste of mental energy that should be directed toward research itself.

Bibliographic efforts conducted at cross purposes, such as we find exemplified in Pharmacy and Chemistry or in Pharmacy and Botany and as are suggested in Tugendhold's proposed plan, afford illustrations of the waste of energy, time and money. Moreover, within one and the same science coöperation should find a place. If, for example, the bibliography of a given subject has been thoroughly worked up for years, why do our associations waste their financial and other resources to cover the same subject less thoroughly?

An illustration of this sort we find in the bibliography of the volatile oils. Since 1877 the chemists of Schimmel & Company have covered this subject in thorough fashion. Nevertheless, several organizations—among them our AMERICAN PHARMACEUTICAL ASSOCIATION—find it necessary to cover the same ground

* Read by Title at the Cleveland meeting of the A. PH. A.

though in but fragmentary fashion. We complain about an insufficient budget and find it necessary to increase our membership dues. Yet we spend at least some of this money uselessly. Especially in the field of bibliographic activity coöperation is not only possible but highly desirable. If the chemical societies of England and the United States cannot agree on a joint publication of their abstracts, this is no reason why our AMERICAN PHARMACEUTICAL ASSOCIATION should not make the attempt at bibliographic coöperation whoever the coöperating parties may be.

The "Reports" of Schimmel & Company are not the only ones in the volatile oil field. Gildemeister's three-volume work on "The Volatile Oils" is not the only one on this subject, but between the two we have a complete treatise with running bibliography covering the entire field in all of its aspects.

Equally admirable, though somewhat different are the Semi-Annual Reports of Roure-Bertrand Fils.

In a university library or a similar institution one naturally expects to find the book literature on volatile oils represented as completely as possible. The pharmacist, however, or the chemist, who is interested in this subject, will not think of burdening his private library with a complete set of "Schimmel & Company's Reports" any more than with the complete book literature on the subject. It will suffice him to have in his possession the new edition of Gildemeister, "The Volatile Oils" of 1910–1922 and the supplemental Semi-Annual, now Annual Reports of Schimmel & Company from April 1913 on, since which time even the size and printed page have been changed to harmonize with the page of "The Volatile Oils."

For the sake of completeness, however, a list of the German Berichte has been added to this suggestion concerning bibliographic coöperation as published in German translation. To the librarian and many a specialist, this list may be welcome. For additions and corrections the writer will be grateful indeed. The references to maps and illustrations ought to prove useful to the custodian of drug and other collections, but more particularly to the pharmacogeographer.

To the same extent to which our modern factories appreciate and apply research, not only for commercial development but to further science as such, to the same extent investigators outside of the factories should affiliate more closely with their colleagues within the factory. Above all, it should be the duty of scientific bibliography, not only to record the results of factory research, but to make the greatest possible use of factory publications for the benefit of all.

The only criticism that may be passed on these semi-annual and annual bibliographic reports is that a general oversight over each year is wanting. This should be written not so much for the specialist as for the general scientist who endeavors to keep posted in a general way outside of his specialty. For pharmacists, perfumers, even for physicians, botanists, pharmacognosists and others such a brief annual survey devoid of details should prove of greatest importance.

* * * * *

That which seems well within reach in the volatile oil field should likewise be possible along other lines. Repeatedly individuals have attempted something of this sort in their specialties, *e. g.*, in the subject of alkaloids. According to the

point of view, the literature on this subject could be worked up along three distinct lines: *firstly*, from the phytochemical point of view; *secondly*, from the structural chemical point of view; and *thirdly*, from the point of view of alkaloidal assay. Whereas the individual undertaking such a task is bound to fail in the end, a larger organization, which disposes, not only over the means, but which has claims on the time and energy of individual specialists as well, should endeavor year in and year out to achieve the end.

Paper plans have their charms for those who develop them. Much more valuable, however, is the accomplishment of but a fragment of a great scheme. The AMERICAN PHARMACEUTICAL ASSOCIATION should strive to create such a bibliographic undertaking. Coöperation on the part of individuals will not be wanting provided the plan is rightly conceived and properly conducted.

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The German copy of this manuscript which was published recently in the New York *Apotheker-Zeitung* (April Number) is supplemented with a table of bibliographic special features of fifty years of the *Bericht* von Schimmel & Co. Most of these Reports have been published in English and not a few in French. It did not seem worth while, however, to prepare corresponding bibliographic tables for these translations. Aside from the incompleteness of the foreign series, the differences would have consisted primarily in the page references. Librarians and others interested in these details are, therefore, referred to the account in the *Apotheker-Zeitung*, published in the same language in which the original *Bericht* appeared.

SOME INTERESTING FACTS ABOUT MERCUROCHROME.

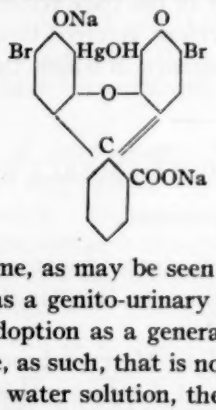
BY FITZGERALD DUNNING.

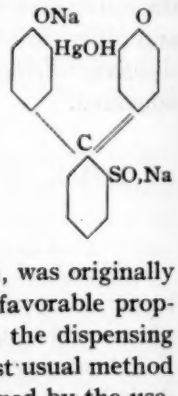
Many of the well-known therapeutic products dispensed by pharmacists in various parts of the country become, in time, so familiar that their chemical nature and history of development are forgotten.

Assuming this fact to be true in regard to Mercurochrome, it would seem desirable before describing practical methods of dispensing this product, to offer a résumé representing the history of its development.

The discovery and practical application of Mercurochrome is involved in the research work directed by Dr. Ira Remsen back in 1889, which resulted in the discovery of saccharin and phenolsulphonphthalein. Phenolsulphonphthalein, among other new compounds, prepared by Remsen and his co-workers, was submitted to Prof. J. J. Abel, Chief of the Pharmacological Department, Johns Hopkins Medical School. Dr. Abel tested these products on animals with the idea of ascertaining whether or not they would show properties which would indicate their value in medical practice. It is quite generally known that phenolsulphonphthalein proved to be of value in estimating kidney function, because of the uniformity and rapidity of its elimination through the kidneys. Dr. L. G. Rowntree, working with Dr. Abel in the Pharmacological Department, was in charge of the work which resulted in demonstrating the value of phenolsulphonphthalein as a kidney functional test, and Dr. J. G. Geraghty applied the results of Rown-

tree's work to clinical practice on humans. The phenolsulphonphthalein which was used for the investigation by Drs. Abel, Rowntree and Geraghty, was furnished by Dr. H. A. B. Dunning, who originated commercial processes for the preparation of this dye stuff. In a conversation with Dr. Dunning, Dr. Geraghty offered the suggestion that a valuable genito-urinary antiseptic might result, if one of the antiseptic metals, such as silver or mercury, might be introduced into the phenolsulphonphthalein molecule. This work was undertaken by Dr. Dunning and ultimately a satisfactory compound was prepared in which the mercury was contained within the molecule of phenolsulphonphthalein, but was not an addition product. This compound was investigated by Dr. E. G. Davis, working in the Brady Clinic, which is under the direction of Dr. Hugh H. Young. Dr. Davis reached the conclusion that mercury phenolsulphonphthalein gave indications of being a satisfactory genito-urinary antiseptic and his results lead to further research on related compounds, which were prepared by Dr. E. C. White, chemist at the Brady Clinic. Dr. White sought and was given coöperation by Dr. Dunning. The result of Dr. White's work was the discovery and preparation of Mercurochrome, in its insoluble form. Later the soluble form, for commercial distribution, was prepared by Dr. Dunning. The similarity between the mercury derivative of phenolsulphonphthalein and Mercurochrome can be seen by a glance at their structural formulæ. The former is represented and the latter





Mercurochrome, as may be seen from the foregoing paragraph, was originally intended for use as a genito-urinary antiseptic, but its extremely favorable properties led to its adoption as a general antiseptic. It is, therefore, the dispensing of Mercurochrome, as such, that is now to be considered. The most usual method of dispensing is in water solution, the strength of which is determined by the use. A 2 per cent solution has been found most satisfactory for general antisepsis. This can be readily made by dissolving a weighed amount of the dry sodium salt, an iridescent green scale, in a measured quantity of water. The solution is stable indefinitely and can be stocked accordingly. Small bottles containing glass rod applicators have been found very serviceable for dispensing the solution, but many other methods are also used. The solution can also be made from 4.6 grain tablets of Mercurochrome, which are available.

It is possible to prepare an alcohol-acetone-aqueous solution of Mercurochrome which has been found very effective as a skin disinfectant, for preoperative work. Combining high bactericidal properties with low toxicity, it is an excellent agent for this particular work. The stain affords a measure of the extent and thoroughness of preparation of the operative field. This solution can be made by dissolving 2 Gm. of Mercurochrome in 35 cc. of water and adding 55 cc. of 95% alcohol and 10 cc. of acetone.

A very convenient method of dispensing Mercurochrome for first-aid work has made its appearance in a first-aid kit now on the market. Ampuls containing $^1/_2$ cc. of a 2 per cent solution are fitted at the sealed end with a piece of stiff gauze to form a brush. By breaking the neck of the ampul, the solution can be painted on the wounded surface immediately. Cotton swabs twisted on the end of wooden sticks and saturated with Mercurochrome solution have been found to facilitate the immediate application of the germicide to the skin surface. The swab is moistened in water for several seconds and then applied. Gauze saturated with Mercurochrome has made its appearance. This may be moistened and used, or, if the wound is bleeding, may be applied dry. It has been found to be very effective in sterilizing bleeding wounds.

Ointments and suppositories of Mercurochrome may be readily prepared. For the ointment, the necessary amount of the compound is weighed and dissolved in enough water to make a 50 per cent solution. This thick syrupy solution is incorporated in the usual manner with a mixture of equal parts of lanolin and vaseline. The suppositories may be made by using the same kind of solution as for making the ointment. This should be added to melted cocoa butter having a creamy consistency, almost at the congealing point. After adding this solution, the mixture should be vigorously stirred and then poured into molds to cool.

In the dispensing of any pharmaceutical product, the possibility of using it in conjunction with other pharmaceuticals to produce a mixture more efficacious than any one of the individual compounds almost always confronts one. It might be well, therefore, to mention the kind of compounds with which Mercurochrome is incompatible. Inorganic acids, and most organic acids (boric acid is a notable exception), salts which give an acid hydrolysis in solution, most alkaloids higher alcohols, and reducing substances are all incompatible with Mercurochrome. The best method of testing the compatibility of any mixture is to add each of the components to a solution of Mercurochrome. If the insoluble form or metallic mercury is precipitated, the mixture will not be compatible. These statements are not meant to be conclusive, but merely to afford a simple criterion for the most usual questions arising from the desire for the use of mixtures.

The foregoing paper has been prepared, not as an exhaustive treatise on Mercurochrome, but with the sole idea of familiarizing pharmacists with its origin, nature, and some of its uses. It is to be hoped, therefore, that this paper will be looked on merely as a rough outline, generalizing some of the available data about Mercurochrome.

MEDICAL EDUCATION OF THE PUBLIC IN ENGLAND.

Under the supervision of the British Medical Association the offices will be opened in many of the large centers and information can be obtained relative to matters of medical education. Medical women will be in charge to answer inquiries relative to the subject. In the country and smaller places the information will be given by medical missionaries in traveling motor vans. The information will be largely relative to diseases which may be prevented and of those that are most prevalent.

Popular lectures on pharmaceutical subjects are given in various cities of the United States and the idea may be carried a little further so as to give the public information relative to the dangers that obtain in patronizing stores where the sole object is the making of money and little regard is had for the safety of the public. Quite a number of the problems which concern the pharmacist are also of interest to the laity.

DEPARTMENT OF BUSINESS MANAGEMENT

Conducted by Paul C. Olsen.*

COMMENTS, QUESTIONS AND SUGGESTIONS ARE INVITED AND WELCOME.

Readers are invited to submit comments, criticisms and suggestions regarding the material which appears in this department. The Editor also will undertake to answer questions regarding general problems of business management. Letters of general interest will be published, but the writer's name will not be revealed without his permission.

ARE QUANTITY DISCOUNTS FAIR TO THE SMALL DRUGGIST?

Every one knows that cut prices in the retail drug business result from a number of causes. For some of these, the druggist is entirely responsible. Others are beyond his control.

The following is a situation for which the manufacturer is accountable. (Incidentally, the manufacturer as well as the retailer, is a sufferer from this situation.) The figures hereafter given are, of course, not exact quotations of the prices of any particular manufacturer, but they are typical of a number of current propositions.

A product, well and favorably known, is intended to sell for 60 cents. The retailers' list price is $4.80 a dozen, making the cost of the merchandise 40 cents a bottle. If the product is bought in gross lots, however, a special discount of 10 per cent is allowed, making the net cost 36 cents per bottle when bought in this quantity.

More than that, if a dealer will agree to buy 10 gross of the product within any one calendar year, he will receive a further discount of 10 per cent from the 36 cent price, making the net cost 32.4 cents.

From the prices given a cash discount of 2 per cent is allowed; thus the lowest price at which this article, intended to sell for 60 cents, can be bought by the retailer is just over 32 cents.

Some people wonder why manufacturers offer special discounts for quantity purchases. Any druggist knows that he is beset continually with quantity discount schemes which are infinitely more complex and hard to understand than the hypothetical example cited.

Manufacturers offer ample justification for their quantity discounts. They say, for example, that it is not ten times more expensive to sell a druggist 10 dozen of an article than it is to sell him one dozen. It costs more, proportionately, to secure small orders and fill small orders than larger ones. Selling in large individual quantities possesses the same possibilities of economy as does production in large quantities. Therefore, isn't it only fair, the manufacturer argues, that the large quantity buyer should receive, in the form of extra discounts, some of the economies which result from this method of buying?

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* Instructor of Merchandising, Wharton School of Finance and Commerce, University of Pennsylvania, Lecturer on Business Administration, Philadelphia College of Pharmacy and Science.

Now suppose we look at the results of these extra discounts from the standpoint of the retailer.

A druggist located in or near a large city, close to numerous wholesale sources of supply, feels that there is no need for him to carry on hand more than a week's supply of a particular item. In the case of the hypothetical 60-cent item discussed here, the druggist's experience has been that purchases of the article a dozen at a time assure him a stock, which, while adequate for his needs, turns over on the average in a week's time.

That means he must buy this article at the dozen price of $4.80. He intends to sell the article at 60 cents. Inasmuch as his overhead averages 25 per cent on sales, his week's profit on sales of a dozen of this particular item is 60 cents, or 5 cents a bottle.

Compare the situation of this neighborhood druggist with that of a huge central city drug store. There the proprietor finds that he easily can sell a gross of the article every week. It is contrary to his policy to buy, at one time, more than a week's supply of a fast selling item; therefore, the price he pays for this item is $4.32 a dozen or 36 cents per bottle.

Although his rent is high, salaries and some other expenses are low; the total operating expenses of the store average the same as the neighborhood store—25 per cent of sales.

This proprietor finds that, with a cost of 36 cents, he can sell this 60-cent article for 54 cents and still make the same rate of profit as his neighborhood competitor, who must obtain 60 cents for the article. Compare the figures in the following tables.

Neighborhood Store.		*Central City Store.*	
Selling price	0.60	Selling price	0.54
Cost of the goods in dozen lots	0.40	Cost of the goods in gross lots.	0.36
Selling expenses (averaging 25% of sales)	0.15	Selling expenses (averaging 25% of sales)	0.13½
Profit	0.05–8½%	Profit	0.04½–8½%

The central city store proprietor believes that his cut price will attract to his store a sufficient number of additional buyers to make up at least the 10 per cent loss in dollars and cents by reason of the 10 per cent price cut.

Turn now to a mammoth department store which long has used its toilet goods department as a cut price leader by which to attract people to the store.

The toilet goods buyer of this store believes that he easily can sell 10 gross of this popular item in a week's time. Selling costs in the toilet goods department of this store likewise average 25 per cent of sales. Notice the costs and profits of this department store on this item, even though the article is sold at the cut price of 2 bottles for 97 cents.

Department Store.	
Selling price	0.485
Cost of the goods in 10 gross lots	0.324
Selling expenses (averaging 25% of sales)	0.121
Profit	0.04–8½%

Like the proprietor of the central city drug store, the department store's toilet goods buyer believes that the attraction of a cut price of nearly 20 per cent will

certainly bring in enough sales to more than make up for the reduction in the dollars and cents amount of each sale.

Thus arises a situation by which a central city drug store and a department store selling respectively at cut prices of about 10 and 20 per cent can make just as great a percentage of profit as the neighborhood drug store which must sell the article at the full price in order to earn that rate of profit. The manufacturer's quantity discount is what makes possible this anomalous and demoralizing situation.

Yet the manufacturer correctly justifies quantity discounts on the ground that small orders are proportionately more expensive to fill than large orders.

The manufacturer who employs quantity discounts of the kind discussed in this article, however, is bringing about a situation which is distinctly not to his own interest. Consider the following facts.

When department stores and large central city stores continuously and profitably sell 60-cent goods at 49 to 54 cents, any druggist knows that the usual price for the article tends all over the city to drop to or near that level. No druggist who has an overhead averaging 25 per cent of sales can make any money selling an item which costs him 40 cents for 49 cents.

What is more, the druggist himself knows this. But he must stock the article because it is in large demand. However, he knows it is suicide for him to push the sale of such an article which must be sold at a price which can result only in a loss. The neighborhood druggist wisely fills his windows and his counters with merchandise for which he can obtain, without difficulty, a price which yields him a profit and, when he has opportunity to suggest additional purchases to his customers, he naturally suggests the things which he can sell at a profit.

The cut-price merchandise remains under the counter, out of sight. Of course, sales are made when customers ask for it, but these sales are only a fraction of what they might be, if the small independent druggists by window and store display and personal salesmanship actually were aggressively pushing its sale. Multiply this indifferent and hostile attitude of the small independent druggists toward widely cut merchandise by the 40,000 or 45,000 merchants there are in the United States. What happens? The only aggressive sellers of this article become the 400 or 500 department stores and the few thousand consistent cut-price drug stores, instead of 40,000 or 45,000 additional small independent drug stores, the sales of which of any one line of goods are stupendous in the aggregate.

The manufacturer's troubles do not stop here. The very thing that in the beginning made this article attractive to the "cut price" merchants was the fact that it was being sold widely and agressively at full prices by this large group of small, independent druggists. When, because of consistent cutting, these retailers begin to stop pushing its sale its value as a "cut price" leader begins to diminish. Eventually, too, it ceases to be a featured item even in the stores in which it had been sold at cut prices.

I don't mean to imply that the course here outlined develops over night and that a product passes to oblivion in a few weeks' time. These changes are a matter of months and years, depending upon how well established the product is. The tendency is the same, however, it seems to me, regardless of how long the time required.

That is the reason a quantity discount which makes possible profitable selling

at demoralizing cut prices really is a boomerang. The manufacturer gives quantity discounts, as was explained, because large orders cost less to fill than small orders. However, these large orders with their resulting temptations to cut prices kill the interest in the product of the vast number of small independent druggists who, by the nature of their businesses, are compelled to buy in small quantities. The result is, that the total volume of business of the manufacturer tends eventually to decrease because the aggregate of all of these small orders is so large. Accordingly, quantity discounts eventually result in decreased sales and increased costs, instead of the increased sales and decreased costs they were intended to produce.

The manufacturer's possibilities of loss of business are accelerated further by the fact that purchasers who buy large quantities of an item to sell profitably at low prices lose interest in that item when it ceases to be widely and aggressively sold at its full price. Thus quantity discounts again defeat their purpose.

SPECULATING IN MERCHANDISE AND BUYING MERCHANDISE ARE TWO DIFFERENT THINGS.

Some years ago the market for buttons mounted on cards was exceedingly demoralized. Importations from Europe were being offered at so little as one-tenth of the usual prices.

One importer with a huge stock on hand called at the offices of one of the largest chains of five and ten cent stores. He offered the enormous quantity of buttons he possessed at a ridiculously low price, because he was desperately anxious to turn this large stock into cash at once. Nearly every one of the styles he offered had been sold by the chain for a long time.

To the surprise of the importer, the chain refused even to consider buying the entire lot he offered at these bargain prices. In vain did the importer warn them that only an unusual market condition made possible this sensational offer at this particular time.

The chain's objection to the purchase of the huge lot at one time was this: "We depend for our profits," they said, "upon small margins, rapid turnover and small stocks. We make little or no attempt to forecast buying tendencies; nor do we, therefore, speculate in merchandise. We aim merely to supply economically and efficiently the demands which we find do exist.

"We sell the very styles of buttons you are offering us and expect to continue to sell them. But we buy what we sell only as fast as we sell it. In that way we reduce to a minimum the danger of overstocking ourselves and also the possibility of having on hand excessive quantities of merchandise, seasonable or otherwise, for which a demand no longer exists.

"We would rather continue to buy these buttons you offer in dozen and gross lots at sixty cents a dozen cards and buy them only as we need them, rather than invest several thousand dollars in a very large quantity purchase and run the risk of a huge loss if the demand should stop suddenly. We lose, of course, the possibility of speculative profits by this method of buying, but we also eliminate the possibility of equally large speculative losses."

Perhaps in this cautious buying policy of a leading chain of five and ten cent

stores there is something of interest for the retail druggist, who is considering the merits of various quantity discount offers which are made to him.

SEASONABLE DISPLAYS FOR APRIL AND MAY.

Easter goods	Housecleaning aids
Perfumes	Camphor, moth balls, cedar flakes
Perfume atomizers	Clothing bags
Toilet waters	Insecticides and germicides
Face powders	Sponges and chamois
Compacts	Soaps and cleansers

Cameras and photographic supplies

A PHARMACEUTICAL STUDY OF SYRUP OF FERROUS IODIDE (1840–1927).

BY CATY J. BRAFORD AND H. A. LANGENHAN.

No. I. HISTORICAL.

Iodine was accidently discovered, in 1812, by Courtois of Paris, a manufacturer of salt-petre, and was first used in medicine by Dr. Coindet, in 1819, during his experimentation on a remedy for goitre. The iodide of iron was used by Dr. Pierquin in 1824.[1] Durand,[2] in 1833, reported that "this therapeutic agent was lately introduced into medical practice, in Philadelphia, by Dr. Jackson, on whose recommendation it is now pretty extensively used in this city and in some parts of the country." It was prescribed under the title of "Dr. Jackson's Solution of Iodide of Iron," and its formula was similar to that used by Baup and Caillot.[3] According to Dunglison,[3] Professor A. T. Thomson, of the London University, presented a paper entitled, "Some Observations on the Preparation and Medicinal Employment of Ioduret and Hydriodate of Iron (1834)," in which he strongly recommended the use of this compound. The result of his report, it is claimed, was the general introduction of the use of this compound. According to the U. S. Dispensatory (19th ed., p. 1224), Thomson proposed a formula for a strong syrup, which it is said was the basis for the British Pharmacopœial formula.

The solution of ferrous iodide was quite unstable and attempts were made to obtain a more permanent product. Frederking[4] in 1839 suggested the addition of a saccharine substance as a preservative and in 1840, Procter[5] acting upon this suggestion experimented with sugar of milk, manna, honey and "uncrystallizable sugar." Dupasquier[6] in 1841 used "Syrup of Gum" and in the same year Beral[7]

[1] E. J. Mowry, *Am. J. Pharm.*, 58, 289 (1886). See also "Dunglison, New Rem.," 5th ed., 300 (1846).

[2] E. Durand, *Am. J. Pharm.*, 4, 287 (1833).

[3] R. Dunglison, "New Rem.," 5th ed., 297 (1846).

[4] Frederking, *Am. J. Pharm.*, 58, 289 (1886), from Buchner's *Rep. du Pharmacie.*

[5] Procter, *Am. J. Pharm.*, 12, 13 (1840).

[6] Dupasquier, *Jour. de Pharm.*, (1841); through *Am. J. Pharm.*, 58, 289 (1886).

[7] Beral, *Am. J. Pharm.*, 13, 74 (1841); from *Jour. de Chem. Med.*

tried simple syrup. Squire[1] recommended the addition of a wire coil to the solution, but "a lady patient wanted to know whether the iron screw must be swallowed whole." Many other reports appear in the literature relating to the instability of the solution. The salt, ferrous iodide, was equally unstable. As a result of the experimentation, the addition of a saccharine substance as a preservative was adopted.

The solution was introduced into the U. S. P. of 1840 under the title of **Liquor Ferri Iodidi.** It contained twelve ounces of sugar in twenty fluidounces of the finished product. The solution was continued in the revision of 1850, then dropped until in 1880 when it again appeared, this time in the National Formulary. The N. F. of 1900 deleted the preparation. The solution as appearing in the National Formulary contained no sugar; hypophosphorous acid was prescribed as a preservative or reducing agent.

Liquor Ferri Iodidi was dropped from the U. S. P. of 1860, and **Syrup of Ferrous Iodide** was introduced. This contained about fifteen ounces of sugar in twenty fluidounces of the finished product, as compared with the twelve ounces of sugar in the twenty fluidounces of the **Liquor.**

As early as 1845 there appeared in the U. S. Dispensatory, a formula for the "Syrup of Iodide of Iron," which had been taken from the Edinburgh Pharmacopœia. It was very similar to the U. S. P. formula (1840), for Solution of Iodide of Iron and differed mainly in the amount of saccharine material present. The U. S. formula prescribed five fluidounces of honey to twenty fluidounces of finished solution. The Edinburgh Pharmacopœia specified four and one-half ounces of sugar to be used in six fluidounces of the finished syrup, such a quantity of sugar being sufficient for the preparation to be classed as a "true" syrup.

The next revision of the U. S. Dispensatory (1851) included the formula for the Liquor as it appeared in the U. S. P. of 1850. The saccharine material had been changed and the new formula prescribed twelve ounces of sugar to twenty fluidounces of Liquor, the quantity still not being sufficient to consider the preparation a syrup. Two other new formulas for the syrup were also included in the Dispensatory. One was the Dublin Pharmacopœial formula, containing six fluidounces of simple syrup to eight fluidounces of the finished syrup, and the London Pharmacopœial formula having ten ounces of sugar to fifteen fluidounces of syrup.

The following "modes of administration" in addition to the Syrup and the Liquor are reported by Dunglison:

Pilulæ Ferri Iodidi, formula by Dr. Christison of Edinburgh (1845).

Vinum Ferri Iodidi, containing one-half ounce of ferrous iodide dissolved in one pint of wine.

Tinctura Ferri Iodidi, formula of Pierquin (1831), containing two ounces each of alcohol and water.

Mistura Ferri Iodidi Composita, formula by Pierquin (1831), containing sixteen grains of ferrous iodide in a mixture of one ounce each of Tincture of Colombo or Tincture of Gentian Compound, and eight ounces of water.

Troschisca Ferri Iodidi, formula by Pierquin, containing one-half ounce of ferrous iodide in one hundred and twenty troches.

Injectio Ferri Iodidi, formula by Ricord (1843), containing three grains of ferrous iodide in six ounces of water.

[1] E. J. Mowry, *Am. J. Pharm.*, 58, 289 (1886).

Unguentum Ferri Iodidi, containing one and one-half drams of ferrous iodide to one ounce of lard.

Creuse,[1] in 1840, prescribed a formula for **Tasteless Iron Iodide,** prepared as follows:

"One hundred twenty-six and three-tenths grains of Iodine are combined with Iron in the usual way to obtain the solution of ferrous iodide. This is filtered and sixty-three grains of Iodine are dissolved in it. A solution of two hundred and one grains of citric acid is exactly saturated with potassium hydroxide and then added to the first solution. When the green apple odor has been developed, the solution is evaporated, with gentle stirring, to dryness, when cauliflower-like masses of acicular crystals will be obtained. These are stable except in direct sunlight."[2]

Ferrous iodide was official as such in the U. S. P. of 1840 and in that of 1850. Galenicals of ferrous iodide were official as follows:

Ferri Iodidum Saccharatum, U. S. P. 1880, 1890; N. F. 1900.
Liquor Ferri Iodidi, U. S. P. 1840, 1850; N. F. 1880, 1890, 1900.
Pilulæ Ferri Iodidi, U. S. P. 1860 to 1920; N. F. 1920.
Syrupus Ferri Iodidi, U. S. P. 1860 to 1920.

That Syrup of Ferrous Iodide is used more or less universally is evidenced by its appearance in various national Pharmacopœias. A list of these with the titles applied to the Syrup follows:

International Protocol—
Ferri Iodidi Syrupus.

Pharmacopœa Austrica—
1855, **Syrupus Ferri jodati.**
1869, **Syrupus Ferri jodati.**
1889, **Syrupus Ferri jodati.**

Pharmacopœa Belgica—
1885, **Syrupus Iodureti Ferri.**
1906, **Ferri Iodati Sirupus,**
Ferri iodidi sirupus,
Sirupus iodeti ferrosi.

Pharmacopœa Britannica—
1867, **Syrupus Ferri Iodidi,**
Syrup of Iodide of Iron.
1885, **Syrupus Ferri Iodidi.**
1898, **Syrupus Ferri Iodidi,**
Syrup of Ferrous iodide.
1914, **Syrupus Ferri Iodidi,**
Syrup of Ferrous Iodide.

Pharmacopœa Danica—
1868, **Syrupus Jodeti ferrosi,**
Syrupus ferri jodati,
Jodjern-sirop.
1895, **Syrupus Jodeti ferrosi,**
Syrupus Ferri jodati.
1907, **Syrupus Jodeti ferrosi,**
Ferri jodidi sirupus,
Sirupus ferri jodati,
Jodjernsaft.

Pharmacopœa Fennica—
1885, **Syrupus Jodeti ferrosi.**

Pharmacopœa Gallica—
1866, **Sirop d'Iodure de Fer.**
1884, **Sirop d'Iodure de Fer.**

Pharmacopœa Graecea—
1857, **Syrupus Ferri Jodutati,**
1868, **Syrupus Ferri Jodutati** (*Supplement* of 1857).

Pharmacopœa Germanica—Deutsches Arzneibuch—
1872, **Syrupus Ferri Iodati.**
1882, **Syrupus Ferri Iodati,**
Jodeisensyrup.
1890, **Syrup Ferri Jodati,**
Jodeisensirup.
1900, **Sirupus Ferri jodati,**
Eisenjodursirup.
1910, **Sirupus Ferri Jodati,**
Jodeisensirup.

Pharmacopœa Helvetica—
1907, **Sirop Ferri Jodati,**
Jodeisensirup,
Sirop d'iodure de fer.

Pharmacopœa Japonica—
1907, **Sirupus Ferri Iodati,**
Syrup of Ferrous Iodide.
1922, **Sirupus Ferri Jodati,**
Syrup of Ferrous Iodide.

[1] Creuse, *Am. J. Pharm.*, 16, 214 (1840).

[2] This is in a way comparable to the tincture of ferricitro-chloride, N. F. IV, in which sodium citrate and solution of ferric chloride are used.

Pharmacopœa Nederlandica—
1871, **Syrupus Iodeti Ferrosi.**
1889, **Sirupus Iodeti Ferrosi.**
1915, **Sirupus Iodeti Ferrosi.**

Pharmacopœa Norwegica—
1870, **Syrupus Iodeti Ferrosi.**
1895, **Syrupus Joeti Ferrosi.**
1913, **Syrupus Jodeti Ferrosi, Jodernsirup.**

Pharmacopœa Suecica—
1879, **Syrupus Iodeti Ferrosi.**

Farmcopea Espanola—
1884, **Jarabe de Ioduro Ferroso.**
1915, **Jarabe de Yoduro Ferroso, Syrupus ioduro ferrosi, Jarabe de protoyoduro ferrosi, Syrupus protioduro ferri.**

Farmcopea officiale del regno d'Italia—
1892, **Sciroppo di protojoduro di fer.**
1920, **Sciroppo di joduro Ferroso, Sirupus jodureti ferrosi, Sciroppo di protojoduro di ferro.**

Svenska Farmakopen—
1871, **Syrupus Iodeti Ferrosi, Jernjodursyrup.**
1879, **Syrupus Iodeti Ferrosi, Jernjodursyrup.**
1901, **Syrupus Jodeti Ferrosi, Jarnjodursirup.**
1908, **Syrupus Jodeti Ferrosi, Jarnjodursirap.**

Codex Medicamentarius—
1908, **Sirop d'Iodure de Fer, Sirop d'Iodure Ferreux, Syrupus ferri iodati gallicus.**

Pharmacopœa Portugueza—
1876, **X. de iodeti ferrosi.**

United States Pharmacopœia—
1860, **Syrupus Ferri Iodidi, Syrup of Iodide of Iron.**
1870, **Syrupus Ferri Iodidi, Syrup of Iodide of Iron.**
1880, **Syrupus Ferri Iodidi, Syrup of Iodide of Iron.**
1890, **Syrupus Ferri Iodidi, Syrup of Ferrous Iodide.**
1900, **Syrupus Ferri Iodidi, Syrup of Ferrous Iodide.**
1910, **Syrupus Ferri Iodidi, Syrup of Ferrous Iodide, Syr. Ferr. Iod.**
1920, **Syrupus Ferri Iodidi, Syrup of Ferrous Iodide, Syr. Ferr. Iod.**

UNIVERSITY OF WASHINGTON,
COLLEGE OF PHARMACY,
SEATTLE.

(*To be continued*)

A RECORD OF THE WORK OF THE CONFERENCE OF STATE BOARDS OF PHARMACY AND REPRESENTATIVES OF THE COLLEGES OF PHARMACY OF DISTRICT NO. 2, N. A. B. P.*

From a synoptic report of the Secretary—Dean Hugh C. Muldoon.

Responding to a call issued by Augustus C. Taylor of the National Association of Boards of Pharmacy, and Dr. A. G. DuMez of the American Association of Colleges of Pharmacy, representatives of the Boards of Pharmacy and the Colleges of Pharmacy of N. A. B. P. District No. 2 met at the Benjamin Franklin Hotel, Philadelphia, March 10–11, 1927.

H. C. Christensen, Secretary of the N. A. B. P., and representatives of the New Jersey State Board of Pharmacy were also present.

The following persons were registered:

District of Columbia—Taylor, Quigley, Kerfoot, Bradley, Fuhrmann.
Maryland—Swain, DuMez, Bunting, Richardson, Powell, Frames.
Pennsylvania—Kramer, Minehart, Campbell, Sturmer, Koch, Cliffe, Walton, Muldoon, Rothwell.
Delaware—Rhodes, Bosey.
New Jersey—Little, McNeill, Bischoff, McCloskey, Riggs, Fischelis, Crooks, Hills.
New York—Diner, Gregory, Anderson, Rusby, Lascoff, Diekman.

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* Philadelphia, March 10–11, 1927.

First Session—Thursday Morning, March 10th.

The purpose of the meeting was stated by Chairman A. C. Taylor to be a free and frank round-table discussion of the problems of common interest to the Boards and Colleges. Dean H. C. Muldoon was elected Secretary.

Dr. DuMez presented the following program, prepared as a tentative program by Taylor and DuMez. It was adopted without discussion as the official program of the conference.

PROGRAM—THURSDAY MORNING SESSION.

11:00 A.M. Call to order by the respective chairmen.
Remarks on the objects and purposes of the meeting.

12:00 M. Luncheon.

THURSDAY AFTERNOON SESSION.

2:00 P.M. 1. The College Course and Board Examinations with respect to
(*a*) Why so many college graduates fail.
(*b*) The purposes of Board Examinations.
(1) Determination of the candidate's general pharmaceutical education.
(2) Determination of the candidate's ability to meet the every-day practical requirements of drug-store practice.
2. Publicity of the results of Board Examinations as a corrective factor in reducing the number of failures.
3. Assistant Registration and Practical Drug-Store Experience with respect to
(*a*) Value of apprentice training,
(*b*) Value of practical experience obtained after graduation from college.

FRIDAY MORNING SESSION.

9:00 A.M. 1. The Pharmacy School Curriculum with respect to
(*a*) Subjects which should be included.
(*b*) Relative values of the subjects.
(*c*) Number of hours which should be devoted to each subject.

12:00 M. Luncheon.

FRIDAY AFTERNOON SESSION.

2:00 P.M. Separate sessions of the Boards and Colleges to formulate, on the basis of the discussions had, any recommendations to be referred to their respective organizations.

Question.—Why so many college graduates fail.

Dr. Diner suggests there are two fundamental reasons:

1. Faulty high school preparation, especially in Mathematics and English.
II. Faults in the college of pharmacy.

The second reason was discussed under the following heads:

1. *Failure to Make a Selection of Candidates for Entrance.*—The purpose of the student is not investigated thoroughly. The student may have trivial reasons for taking up the work. Numerous students take up Pharmacy without a knowledge of what the profession gives them and of what they must give the profession. The remedy lies with the college.

2. *The Curriculum.*—Should be better balanced. Attempts to over-emphasize a department should be checked. The department of Pharmacy should be strongly emphasized. Some teachers overwhelm the student with a mass of material. A suggestion was made that the 2250-hour curriculum might be apportioned as follows: Pharmacy, 900 hours. Chemistry, 750 hours. Materia Medica, 600 hours.

3. *Methods of Teaching.*—Teaching methods can be improved. Students must be taught to reason and to give concise and comprehensive answers, not in the words of the teacher.

4. *College Examinations.*—Frequent written examinations followed by a thorough discussion of each examination encourage every-day preparation of work, and discourage cramming.

5. *Board Examinations.*—General questions and obscure questions should be avoided. The question should aim to find out what the student knows, and to determine his fitness to render professional service to the community.

6. *Rating of Examination Papers.*—Requires much time and thought. The examiner may have a preconceived answer in his mind, but that answer may not be the only correct one.

7. *Value of Oral Examinations.*—An oral examination is fleeting and leaves no impression in the mind of the student or the examiner. The candidate has no chance to correct errors. The examiner may be inattentive.

Dr. Walton.—*I. The Schools.*—A larger number of students have failed during the past few years than formerly. The reason is not clear. The Boards cannot remedy the faulty high school preparation of candidates. Not inclined to blame the colleges, for the number of successful candidates shows that proper training is being given. Some few students of doubtful fitness may be graduated with the idea that the Board will not license them, if their showing is unsatisfactory.

II. The Boards.—Board examinations may err in scope, being either too restricted or not restricted enough. Examiners try to give every candidate full credit for what he knows. Papers of border-line candidates are always reviewed to insure fair ratings. A number of candidates are able to reach the 60% passing mark but are unable to attain the required general average of 75%.

There should be more uniformity in Board questions. The possibility of finding some method of having examinations approved by the Faculties and the National Association of Boards of Pharmacy was mentioned, but no plan was suggested.

Replying to a question of Dr. Rusby, Dr. Walton stated that there has been a change in the character of examinations in the last few years. The tendency of the Boards is to raise standards. Examinations may be influenced by the changing personnel of the Boards.

Mr. Swain questioned the influence of poor high school training as an important factor in the number of failures before the Boards. The colleges deal with the same men that the Boards do. Inferior high school training should be reflected in the student's college work as well as in the licensing examination. He asked how the percentages of failures in colleges and before Boards compare.

Dr. Diner and others discussed percentages of failures in college and suggest that a 20% loss in a class from entrance to graduation is not excessive.

Dr. Gregory stated that a higher student mortality in college should result in a smaller percentage of failures before the Boards. More students are now dismissed by faculty action than formerly. The greatest percentage of loss should be in the Freshman year, and unfit students should be eliminated as early in the course as possible.

Second Session—Thursday Afternoon, March 10th.

Question.—Why so many college graduates fail. (Continued.)

Dr. Rusby.—The percentage of failures in college examinations is greater than formerly, but the average standing of all students is higher. There is also a greater difference between the good students and the poor students. Graduation of students from high schools with an average of less than 75% was criticized. High school examinations are not difficult enough. Too little attention is paid to general scholarship. A change in the type of college student is noted.

Dr. Koch.—Some of the difficulties of the college student can be laid to the fact that students in the lower schools are taught that education is play, and should be easy and pleasant. Responsibilities are avoided, and students take the road of least resistance. There is lack of ability to concentrate.

Dr. Little.—Failure of graduates to pass the Board examinations may be attributed either to the college or to the Board, or to a lack of coördination and coöperation between the two. He suggests the formation of a new organization composed of Board and College men to determine the source of trouble when in any State there continues to be an abnormally large number of failures before the Board.

Dean Anderson.—Students come to college with bad study habits. They feel that they may forget what they have learned as soon as the final examination is passed. Fundamentals should receive greater stress. It is difficult to impress students with the importance of their work. Practical examinations should be given in college. They should have greater weight than the strictly theoretical part. He suggested the desirability of an exchange of questions between Colleges and Boards so that concrete problems for study may be furnished.

Mr. Swain believes that no great good can come from the creation of a new organization such as suggested by Dr. Little. Boards and colleges can confer at their pleasure and smooth out any difficulties. Frequent conferences would do much good. The suggested organization would have no legal standing.

Dr. Little agrees that Pharmacy is over-organized; also that Boards are competent to determine the ability of the candidate; 90–95% of the graduates should pass the Board examinations. When the percentage of failures continues to be high, there should be a disinterested organization to study both the colleges and the type of Board questions in order to determine where the trouble lies.

Mr. Hills presented a tabulation of results of a study of recent Board examinations in New Jersey. The largest number of failures is in Practical Pharmacy and the smallest number in Theoretical Pharmacy. The candidates in the July examinations are the most successful in passing the examinations.

Dr. Fischelis.—Part of the present difficulty may be due to the transition from the two- to the three-year course. Some candidates take advantage deliberately of their several opportunities to take the examinations, and study only for certain subjects of each examination. Delay in taking the examination after graduation may be a factor. Colleges should train their students so broadly that the type of question asked by the Board will be a matter of no consequence. Colleges are not obligated to see that their students pass the licensing examinations. They are only obligated to give their students an education in pharmacy.

Dr. Little.—It is a comparatively simple task to prepare students for Board examinations, but there is an obligation to the student on the part of the college. Good might result from a study of examination questions by the heads of departments in the colleges and the members of State Boards who prepare and rate examinations in each subject.

Dr. Minehart.—Failures to pass examinations may be due to a "complication of diseases." The curriculum is "out of gear." The three-day-a-week program presents difficulties. Lack of time to do library work is deplorable. It might be a good idea to publish lists of failures of each school at each examination. An investigation should be made if the rating of a school is low. Care in grading papers is necessary. The "key" method is unsatisfactory.

Dr. Gregory drew attention to the "Pharmaceutical Syllabus." Its original purpose was to be of service to both the Boards and colleges. It has not outlived its usefulness.

Mr. Kramer presented a study of the results of a recent examination. The ratings of 12 successful and 12 unsuccessful candidates in each branch were tabulated, and the ratings on each question given. The idea of the study was, if possible, to determine whether the results were due to the knowledge of the candidate, the teaching of the college, or to the maker of the examinations. Sufficient time to make a detailed study was lacking.

Mr. Christensen.—Such a study as that presented by Mr. Kramer can be continued to advantage. If the results of every question in each examination were to be tabulated, the general average of all candidates on each question could be determined. If a large number fail, the Board and the college should study the question and the answer to the question to find out where the trouble lies.

The wording of a question is often susceptible to improvement. Board members may need assistance because of changes in the personnel of the Board. Old-time questions should be eliminated. Colleges may get in a rut and fail to progress with the times. More attention should be paid to biology and like subjects, with perhaps less stress on botany and pharmacognosy.

Question.—The Purpose of Board Examinations: To determine the candidate's general pharmaceutical education. To determine the candidate's ability to meet the every-day practical requirements of drug-store practice.

Dean Muldoon.—Recent changes in curricula give increased time to the teaching of "commercial pharmacy." While it is well understood that the use of the Pharmaceutical Syllabus by the Boards and colleges is not obligatory, the fact that the Syllabus suggests 125 hours of commercial pharmacy in the 2250-hour course, apparently gives approval for the use by the Boards of questions on this subject. But the Syllabus further states that questions in commercial pharmacy, if given at all, should be very limited, and that the function of the examination is not to test the candidate's qualifications as a business man. While admitting the right of the Boards to examine on business subjects, the propriety of doing so is questionable since the func-

tion of the Board as a guardian of public health is merely to prevent the unsafe from practicing. While it is the duty of the colleges to give business training, the Boards should not include questions concerning it in their examinations.

Dr. Fischelis.—The function of the Boards is to see that those who are empowered to dispense are fit to do so. Colleges must take cognizance of the fact that pharmacy is both a business and a profession. The public does not expect that the Boards shall pass upon the business qualifications of the pharmacist. The Commonwealth Study has shown that two things are expected of the pharmacist: 1. Proper service in compounding. 2. The dissemination of public health information. The Study includes so much material under the second head that courses must be lengthened, if all of it is to be taught. It is possible that we are approaching a separation of stores into the merchandizing and professional types without effort and without legal action.

The Board's duty is to decide the fitness of the candidate from the standpoint of the pharmacy law in the State in which the Board is functioning.

Dean Gregory disagrees with the teachers who, in an attempt to maintain pharmacy strictly as a profession, take the stand that there shall be no commercial training in colleges of pharmacy. The relation between the pharmacist and community is indirect, and the pharmacist may never come in direct contact with the people he serves. Colleges should pay more attention to the requirements of the retailer, who is the consumer of the product of the college. New York State favors the gaining of experience both before and after the college course. There must be no letting down in the professional training, but commercial training should be added.

Dr. Rusby.—There must be more training in pharmacy proper and also more work in commercial pharmacy in the colleges.

Question.—Publicity of results of Board examinations as a corrective factor in reducing the number of failures.

Dr. DuMez.—There is need for a remedy for the high percentage of failures. If the percentage of failures in each examination of the graduates of each college were to be published it might effect an improvement. The practice obtains in medicine and dentistry, and the results are gratifying. The immediate effect would be to instigate an introspective study in those schools whose graduates fail in large numbers. An effort would be made to correct any weakness discovered. If the percentage of failures continues to be high, either the Board is not examining in the subjects in the curriculum of the college, or the college is not teaching well. In either case the Board and the college will be brought together. Publication in the JOURNAL OF THE A. PH. A. or in the Proceedings of the A. A. C. P. is suggested. The number of graduates of each college taking the examination, and the percentage of successful candidates should be shown. Data could be compiled by the Secretary of the N. A. B. P., or by a special tabulating committee.

Dr. Sturmer.—To be of greatest service to the college, the data should show not the successes and failures of all students but rather of the last class to graduate.

Dr. DuMez.—The A. M. A. records the year in which the candidate was graduated.

Dr. Little suggests that the order of application might be reversed. If the Boards and colleges are brought together first, the publication of the data might be unnecessary.

Dean Gregory.—The tendency to teach for Board examinations rather than to give a well-rounded education might be increased. Difficulties of collecting the data were shown.

Dr. DuMez.—We want to know in what respect our courses are weak, so that we can correct the weakness. Publication would not reflect on any college unless it continued to have a high percentage of failures.

Dr. Rusby.—Would there be less inclination to correct weaknesses if the data were given to the schools direct instead of publishing?

Dr. DuMez.—No.

Dr. Rusby suggested that for a time the data be given to the colleges direct.

Dr. Walton.—If the tabulation were confined to the June examinations only, the task for the Boards would not be so great.

Dr. Diner.—A premium may be put on cramming. It is well to obtain the information individually, but publicity should be guarded. It is desirable to have data as to schools, year of graduation and results by subjects, individual and total.

Dr. Fischelis.—Such data should not be used by any college for purposes of publicity.

Dr. DuMez was directed to prepare in writing a resolution relative to the matter under discussion, and to present it at the next meeting.

Secretary Christensen.—A somewhat similar plan has been under consideration by the Secretary. Because of the change to the three-year course, it was not thought wise to begin it at the present time. It is desirable to collect statistics now, but publication should be delayed until the three-year course is thouroghly established. Schools will be more careful in graduating weak students if publicity is given to the success of the graduates before the Boards.

Question.—Assistant Registration and Practical Drug-Store Experience with respect to (a) Value of apprentice training. (b) Value of practical experience gained after graduation from college.

Dean Anderson drew a distinction between apprentice training in the old-time store and in some professional stores to-day, and the drug-store experience gained in the average store to-day. The high school student who works in the average store after school hours gets little valuable experience. Colleges can give better apprentice training than can be obtained in that way. The best men in pharmacy cannot be produced without store experience in addition to college work. A feeling of responsibility is developed. Every graduate should be compelled to serve one year in a drug store after graduation before he could be licensed as a pharmacist. The increase in the number of stores would thereby be checked. The Board would have little difficulty in keeping a record of such experience. In answer to a question as to whether the degree should be withheld until such experience had been gained, Dean Anderson stated that in his opinion such action would be acceptable in principle, but that the State laws would have to be considered.

Dr. Taylor outlined a comprehensive plan of apprentice training distinct from the way in which the ordinary worker in a drug store is trained. The plan was offered as a step in eliminating the impractical graduate. A revival of apprenticeship is being agitated in all lines of industry. The man is better adjusted to his life work; his judgment, industry and health will be improved. The selection of apprentices should be based on both economic and social grounds. The contract should specify the ground to be covered and the objectives to be attained. The work of training should be carefully planned and carried out. The work accomplished must be graded. Incentives for good work should be offered. Complete records must be kept. High ideals must be held up.

Dr. Lascoff discussed the value of experience obtained before and after the college course. If experience is gained after graduation, the graduate will take more care in the selection of an employer and he will be apt to get better training. From the standpoint of the proprietor, the graduate is a much better man to handle than the high school student.

Dr. Taylor.—Under the suggested system of apprentice training special care would be taken in the selection of apprentices. A man is satisfied if he knows that he is learning something every day. By supervised study and reading, the apprentice can be shown his relationship to the great pharmacists of the past. A better morale will result.

Dr. Swain has been of the opinion that the grade of Assistant Pharmacist should be abolished. There are great difficulties in controlling the practical experience. He suggests that it may be wise to examine men in theoretical subjects immediately after their graduation from college. If the examination is passed, an Assistant Pharmacist certificate might be issued. After working in a store for one year, the practical examination is undertaken. If the candidate is successful, the license as Pharmacist is issued and the Assistant Pharmacist license is withdrawn. The candidate should find less difficulty in passing his examinations. The experience could be controlled by the Board. Legislative enactment, however, would be required to put the plan in operation.

Dr. Diekman outlined a similar plan that had been in operation in New York State. Theoretical subjects were examined upon at graduation, and the practical examination was given when a total of four years' experience had been gained. Difficulties were encountered in the improper use of the certificates issued to "Junior Pharmacists" on passing the theoretical examinations. The present plan is to examine the candidates in the same way as before, but no license is given when the examinations in theory are passed. The difficulties and advantages of a real apprenticeship system were enumerated.

Dr. Fuhrmann.—Students should have practical experience before taking up college work.

A better understanding is had of the requirements of the profession. Fewer men will drop out. Practical experience gained after graduation will be taken more seriously. Graduates can gain more in one year than in three years before the college course. Fewer failures in college and before the Boards would result if one year of experience were required before the college course and one year after graduation.

Dr. Fischelis.—Perhaps the colleges may become interested enough to supervise the drug-store training of their students. A faculty member might be delegated to visit the stores in which the students work. The plan worked well in the case of students trained under the Veterans' Bureau.

Dr. Koch.—In the report of the Commonwealth Study the statement is made that practical experience is essential, but too much time is wasted. Six months of properly supervised experience is sufficient. He suggested that in June each student be placed in a store of the right kind and that in the fall a record of his summer's work be submitted.

Mr. Rothwell.—Some of the difficulties of the graduates can be laid to lack of practical experience before entering college. Colleges should not admit students who have not had drug-store training.

Third Session—Friday Morning, March 11th.

Dr. A. G. DuMez, presiding.

Question.—The Pharmacy School Curriculum with respect to (a) Subjects which should be included. (b) Relative values of the subjects. (c) Number of hours which should be devoted to each subject.

Dr. Sturmer. *High School Preparation.*—The curriculum is always in the making. Complaint against the high school may be justified, but the college must accept conditions as they are and supply any deficiency. If the student comes poorly prepared in Mathematics and English, the college must remedy the defect. Modern methods of teaching English are subject to criticism. Arithmetic is dealt with only in the lower grades, and some high school graduates cannot divide fractions or place a decimal point correctly. Handling of decimals is a vital matter in connection with the Metric system.

Changing Conditions in pharmacy must be reflected in the curriculum. Students must be taught to adjust themselves to the economic conditions of their generation. Even if in some stores the strictly pharmaceutical work may be as low as 10% of the total work of the store, the responsibility of the college to make their graduates competent for that 10% is as great now as in the days of Procter. Pharmacy must be taught thoroughly and extensively even if much work formerly done in the store is now done by someone else. If commercial training is to be given in the college it must be added, and not substituted for other pharmaceutical work.

Board Examinations.—There are all kinds of colleges, boards and examinations. Peculiar cases are usually only temporary. If a large number of graduates fail, there must be a reason. If the Board covers ground not covered by the college, a change in curriculum is indicated, and the college can take care of it. If the fault is not in the college, the Board can remedy the difficulty. There is little time to reach back into ancient history and teach in detail the methods of long ago. Students are taught modern methods and processes. Questions concerning green iodide of mercury and tyrotoxicon were suggested as being of the unsatisfactory type. If examination questions are not suitable, the student who really knows considerable about the subject will receive a low mark. Questions should be aimed at finding out if the candidate will be a safe man in the drug store.

Bacteriology.—It is debatable whether this subject should be included in the minimum course in pharmacy. The student should have a general knowledge of the subject. It links up with serology and public health information. But it must be remembered that the student is to be a pharmacist, not a bacteriologist.

Chemistry.—It is difficult to decide what should be in the course in chemistry given to the student of pharmacy. Should it be descriptive chemistry? Should the philosophic aspect be cut down? Should it be given as it was given thirty years ago or should cognizance be taken of advances, and modern chemistry be taught? We must give modern chemistry. It is not necessary that Boards ask questions on chemical philosophy, although the schools would not object if it were done. The schools would object, however, if questions in chemical theory were given which the examiner did not understand himself and which he would have to grade with a key.

Materia Medica Has Changed.—It used to deal mainly with the identification of crude drugs. Crude drugs are not found in many stores now except in packages, and the original reason for stress on crude drugs has disappeared. Shall we continue teaching it? To what extent? To what extent shall the microscopic study of crude drugs be taught? If these subjects are to be stressed, we want to know it. The problem is bigger than merely passing the Board examinations. The average graduate should pass the Board examinations without difficulty. If our curriculum is wrong, we want to know it.

Publication of Board Examinations.—There is no special reason why examinations should be kept secret. It is not done in other examinations. Subjects are broad and the possible questions are many. All that the student gets from a study of the questions of previous examinations is an idea as to the scope of the examination. If the colleges were enabled to improve their curricula and the student were helped, some publicity of examinations would not be objectionable. If we give many things in our courses that the Boards do not cover at all, the student might argue that he has to learn things that it is not necessary for him to know. That is a matter for the colleges to face.

Classes of Students.—Some persons say that the difficulties of the drug business can be traced to the influx of foreigners. Sweeping statements are to be avoided. The foreigner is not one of our difficult problems. We have many wonderful foreigners, and America is richer because of them. All of our students are human beings. We are preparing them for their life work. We should feel encouraged with the results of our work. The small number of students passing the Board examinations in certain States is merely an incident. We have in our modern classes students who are just as fine as the best of years ago. They will become just as great. We deal only with potentialities, and must not compare the young with mature people and their achievements. Our problems are irksome but not vital.

Dr. DuMez.—The sub-headings of this question are so closely interwoven that it will be impossible to separate them to advantage. What is said relative to the number of hours will have to be rather general.

Dr. Koch.—We cannot place a relative value on the different subjects unless we have a fixed viewpoint from which to start. We do not have it; we may evaluate for many different reasons. We want to turn out pharmacists, but the kind of pharmacist we want to turn out makes a difference in the evaluation. Shall he be a highly scientific pharmacist or a counter salesman? Fundamentals are important for we must have a foundation. Pharmacy must come first. The problem of the general educator is to teach students to think and reason. The pharmaceutical educator must go further, for pharmacists must have a great fund of detailed specific information about the things he is to handle. The ordinary college student may forget details. In placing a relative value on the different branches, the hour value seems to be the only unit of value. Views and needs have changed. The first Syllabus divided the course into three equal parts, pharmacy, chemistry and materia medica. The idea was not successful. Time for Latin, arithmetic, jurisprudence and similar subjects was taken out of the time allotted to pharmacy. We should devote at least one-third of the time to pharmacy proper and the related subjects should have time of their own allotted to them. Materia medica has changed. More material is now given. We are to make pharmacists, and pharmacy should have more time. Working in a store gives knowledge and ideas that cannot be obtained in school. Contact with the public is important.

Dr. Little submitted an outline of the courses to be offered to the entering class of the New Jersey College of Pharmacy at the opening of the new year. Suggests that changes in curricula of any school will be influenced by the locality and by what the previous course has been.

Secretary Christensen feels that there should be some attempt to secure more uniformity in the curricula of the schools. The change to the three-year course seems to have been accomplished in a rather haphazard way. Some schools spread out their former two-year course over the three years. Others, especially where a medical staff could be drawn upon, have included medical subjects in the pharmaceutical curriculum. All schools are trying to fit men to do the same thing. Pharmacy is the same in practically all localities. Greater uniformity of curricula is desirable. Meetings of the present type should aid in bringing this about and in devising the best method. Examinations are now more uniform and of a higher type than

formerly. In some curricula there have been too few changes; the school has not progressed with the times.

Dr. Walton.—Board members do not have the basic information that would enable them to advise as to the number of hours which should be devoted to each subject. Board examinations should be limited, in chemistry, to fundamentals and to their application to pharmacy. The subject is so broad that the examination must be made with the idea of determining what the candidate needs to know. In spite of the work that the colleges are doing to remedy poor preliminary training in mathematics, many candidates still fail to pass. Isn't there some way for the colleges to assure themselves that their graduates are qualified in mathematics? It is difficult to reconcile complaints against the curriculum with the fact that there are a large number of successful candidates. In determining the ability of candidates the Boards have only one examination on which to base their conclusions. In colleges the student's entire record is available. If the Boards had more information at their disposal, they might also take it into consideration.

Dr. Diekman.—Chemistry examinations should be confined to chemistry as it applies to pharmacy. Where a choice of questions is permitted, the candidate seldom chooses a question in mathematics, but when he does he usually gets it right.

Dr. Swain.—The Board work of the usual Board member is only incidental to his regular work. He may not keep up with the developments of science, especially in chemistry. He may find answers to questions giving information that the examiner did not previously have. The reading of non-technical books such as "Atoms and Rays," "The Romance of the Atom," etc., would make the examiner better fitted to meet the situation.

Dr. Anderson.—The use of an average grade does not meet the situation in all cases. In such points as the calculation of doses each candidate should be made to obtain 100%. There should be no attempt to tie the schools down too closely to the number of hours in each separate subject. It is right to specify the number of hours for each main division, but the sub-divisions should be left to the judgment of the schools. Different teachers will not cover the same ground in the same time. Neither should the time to be devoted to lecture, laboratory and recitation in each separate subject be specified. It doesn't matter whether a lecture is given in a laboratory or in a lecture room. Nor does it matter whether a certain exercise is given in a class in pharmacy or in a class in manufacturing chemistry.

Dr. Diner.—Enough hours should be devoted to a subject to teach it thoroughly. Laying down hard and definite lines for each subject leads to cramming or to shamming. Definite requirement as to major divisions is right; of sub-divisions is a handicap.

Dr. Fischelis.—The disposition of the Boards in making their requirements is to give a wide latitude, but to insist upon certain essentials as a minimum.

The individual teacher must be considered. Students should be furnished with the best teaching ability that can be obtained. Must the masters of the schools let so much teaching be done by youngsters because the masters are so busy? If a candidate is well grounded in fundamentals he will pass the average examination, even if it is of informational character. School curriculums must not be fixed. The Board members must have the same privilege of experimenting. Board members take failures to heart, and try to find the trouble. The Boards are very lenient in their rating of a candidate's ability. The Commonwealth Study report will give a real basis for the division of time. The report doesn't suggest the number of hours, but it does tell what the pharmacist needs to know. In time the Boards will depend more on the college for the responsibility of determining what a man knows about the more intricate procedures. The fitness of the man to practice pharmacy will be the work of the Board. Both the colleges and the Boards should study the Charter's report in the preparation of the curricula and examinations.

Dr. Little.—The teacher makes the college. Young men who were unprepared may have been given charge of courses. An organization such as previously suggested by me could determine if the failure of candidates were due to such causes.

Dr. Minehart.—Boards have a right to experiment with their questions. The results of their experiments will be of interest. The high percentage of failures in pharmacy as compared with medicine and dentistry is a stigma on pharmacy.

Dr. DuMez presented the resolution which he had previously been directed to prepare. After discussion and amendment it was adopted as follows:

Resolved that it is the consensus of opinion of this Conference that statistics should be compiled by the Secretary of the N. A. B. P. showing the percentage of failures in each subject before pharmaceutical examining Boards, by States and colleges; that these statistics be sent out by the Secretary to such Boards and colleges as request them, each college to be entitled to its own records only; and that such statistics shall not be used for publicity or advertising purposes by any one.

Dr. Taylor.—The records of this conference will be edited by DuMez and Taylor and after editing will be mimeographed and sent to members present at the conference. The many good things that have come from this conference will stimulate meetings in other districts.

Upon motion, a rising vote of thanks was given the Secretary.

At a fourth session, a résumé of the proceedings was read; thereafter, the members of the Boards and representatives of the Colleges went into separate sessions.

Meeting of Representatives of the Colleges.

A. G. DuMez, presiding.

Dr. DuMez.—The purpose of the separate meetings was to give each group an opportunity to formulate resolutions, if advisable—based on the matters discussed at the general conference, such resolutions to be presented to the national organizations. Resolutions might be made on each of the topics discussed or on the results of the conference in general.

Mr. Cliffe.—Would the administrative officers of the colleges be interested in supplying to the Boards more complete information regarding the college record of their graduates? The college has the advantage of the Board in knowing the complete record of the student.

Dr. DuMez.—The Boards should request such information if they care to have it.

Dr. Diner.—Certain Boards do require a statement of the subjects, hours and grades of each candidate.

Dr. Minehart.—Pennsylvania now requires only the general average.

Mr. Cliffe.—As a former Board member, I know the help such a record might be to the Board; the doubtful cases cause most trouble.

Dr. Sturmer.—Any college will give such information on request.

Dr. Anderson.—It is a question what consideration a Board would give to such a record. The Board stands between the college and the public. It would weaken the position of the Board to consider what the college has found out about a man, especially in the case of weak candidates. The suggestion should come from the Board, rather than from the school.

Dr. Bradley.—Such records would be used only in doubtful cases. If a student is a few points low and his college record is good, these should be considered.

Dr. Sturmer.—We know that one examination is not an adequate test. In the matter of furnishing the record, our position is that we should be willing. We do not mind the work. We will furnish the record on request.

Dr. DuMez.—No action need be taken on the question. There is general agreement that the records will be supplied if asked for.

Dr. Anderson submitted the following resolution which was passed by consent:

Resolved that it is the opinion of this body that the presentation of State Board of Pharmacy examination questions with a record of correct and incorrect answers and the rating of successful and unsuccessful candidates, at joint meetings of colleges and Boards will be of decided advantage in determining why so many college graduates fail in the State Board examination.

COURSE IN MEDICAL LITERATURE AND BIBLIOGRAPHY.

The Long Island College Hospital of Brooklyn has inaugurated a course in medical literature and bibliography. An attempt will be made to show the students the value of literature which constitutes an important part of the background of this work and to teach them how to use a library. Librarian Charles Frankenberger of the Medical Society of the County of Kings is one of the lecturers. He is widely known for his information relative to medical literature and as expert librarian.

THE DEPARTMENT OF THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY

Wilford Harrison, President, Wichita Falls, Texas. J. W. Gayle, Treasurer, Frankfort, Ky. W. P. Porterfield, Chairman of Executive Committee, Fargo, N. D. H. C. Christensen, Secretary, 130 N. Wells St., Chicago, Ill.

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Georgia	Minnesota	Oklahoma	West Virginia
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Indiana	Montana		

DISTRICT MEETINGS.

DISTRICT NO. 4.

The joint meeting of Boards and faculties of District No. 4 held in St. Paul, Minn., on Feb. 9th was well attended, and the program as published in our February Department of the JOURNAL was carried out. Vice-President Hugo O. Peterson presided.

Those present at the meeting were:

J. W. Slocum, Iowa Board of Pharmacy, H. L. Haussamen, North Dakota Board of Pharmacy, Hugo O. Peterson, Minnesota Board of Pharmacy, Edwin A. Brown, Minnesota Board of Pharmacy, J. P. Jelinek, Minnesota Board of Pharmacy, Marie A. Piesinger, Minnesota Board of Pharmacy, J. W. Dargavel, Secy., Minnesota Board of Pharmacy, Dean Frederick J. Wulling, College of Pharmacy, University of Minnesota, Dean W. F. Sudro, School of Pharmacy North Dakota Agricultural College, Dean E. R. Serles, School of Pharmacy South Dakota State College, H. C. Christensen, Secy. National Association Boards of Pharmacy.

The question as to why so many college graduates fail in State Board examinations, while not included in the tentative program, was discussed by members present at some length with benefit to all. The consensus of opinion seemed to be that the colleges should adopt a selective method of passing on applicants for entrance to college, and probably to some extent there should be a rearrangement of the college curriculum for the three- and four-year courses; then through cooperation of Boards and colleges and discussion in these joint meetings, it was thought that a more satisfactory condition would result. All present took part in the discussions with the result that a number of resolutions were passed, reendorsing the following:

1. Minimum examination entrance requirement of four years of high school, graduation from a recognized school of pharmacy, and sufficient experience in a retail drug store under a registered pharmacist to make a total of four years when added to college time. To require only one year of retail experience from three- and four-year graduates.

2. Consultation with the N. A. B. P. Secretary in order to procure uniformity in examination entrance requirements

3. Adding subjects of Bacteriology and Pharmaceutical Jurisprudence to examination suggested, but left to discretion of individual boards.

4. Basing examinations hereafter on the tenth revision of the U. S. P. and N.F. V but showing leniency in grading papers, owing to the recency of the change.

5. Boards of Pharmacy should meet with the members of the faculties of schools of pharmacy and the Education Committee of the State Association at least once each year in their respective states.

6. Obtaining authentic information as to education, experience, etc., from applicants for examination and reciprocity to reduce the danger of fraud to the minimum. Filing of duplicate examination grade sheets in the N. A. B. P. Secretary's Office.

7. Applying the rule requiring one year of experience since registration in the state of examination only when there is evidence of evasion and accepting worthy candidates who cannot meet this requirement.

DISTRICT NO. 2.

Vice-President Taylor of the Boards and Dr. DuMez acting for the colleges are to be congratulated for planning and carrying out the very successful joint meeting of the Boards and colleges in District No. 2, held on March 10th and 11th at Philadelphia, Pa. This district is comprised of Delaware, the District of Columbia, Maryland, New Jersey, New York and Pennsylvania. Every Board was represented by delegates, and every school in the district, with the exception of two.

The meeting opened with a discussion and analysis of college curricula and Board examinations, in an attempt to avoid conflict and thereby reduce the number of failures among college graduates in State Board examinations. Many interesting side lights were brought out in this discussion, and the very comprehensive report taken by Dean H. C. Muldoon, as Secretary of the meeting, is published elsewhere in this number of the JOURNAL and will be sent to all Board and faculty members in the District by Chairman A. C. Taylor.

Dr. Jacob Diner, of New York, opened the discussion of the above-mentioned topic, and because of the interesting analysis of the subject and the valuable comments and suggestions made by him, permission has been obtained to publish a summary of his remarks, as follows:

"There are a number of contributing causes for the failure of college graduates at Board examinations.

"1. *The Preliminary Education.*—A large number of high school graduates are woefully deficient in the fundamentals, such as simple arithmetic and the ability to express themselves in English, not to mention spelling. Much of this deficiency is due to the fact that most high schools, especially in the larger cities, and I can only speak of New York City as far as personal observation and direct information are concerned, are so overcrowded that the teachers are compelled to advance students to the next higher grade to accommodate those who are clamoring for admission. Furthermore, I understand that teachers are rated down by their superiors if a sufficiently large percentage of the class fails to advance. This, of course, is not necessarily the fault of the teachers, nor of those higher up, but rather is due to the tremendous increase of population in urban districts and the legal requirement that a student must remain in an educational institution until the sixteenth year of age has been attained. As a result of this, many boys and girls who would otherwise enter remunerative occupations find themselves eventually pushed out of high school with a diploma and an exalted opinion of their 'educational attainments!' Business or trade is not good enough for them, and they cast their eyes on professional education, with all the emoluments and prestige which it will bring them. Among all professional schools available, pharmacy offers the easiest road to a profession and therefore many try to enter a college of pharmacy, and mostly succeed.

"2. *Selection of Sudents.*—It is the duty of every educational institution to afford an opportunity for higher education to any one earnestly desiring it and fundamentally qualified. But this does not necessarily mean that every applicant for admission to a school of pharmacy, having a high school diploma, or its equivalent, must be accepted. I believe that those in charge of admission should carefully determine the fitness of the candidate, first by his record in high school, and secondly, by a personal interview to fathom, if possible, the candidate's mental reaction and capacity, and the reasons for his choosing that particular profession. We have done this for a number of years at the Fordham University College of Pharmacy and are greatly pleased with the results. The careful selection of the students admitted will be reflected in the greater number of successful students in the college and State Board.

"3. *College Curriculum and Method of Teaching.*—The curriculum as outlined in the Syllabus is an excellent one. However, heads of departments are often prone to overestimate the value of their subject and if sufficiently backed by political ability and strong lungs, their insistence may be crowned with success to them and dire calamity to the student. The methods of teaching are, of course, of the greatest importance. If we teach our students how to study, if we emphasize that the work done is in preparation for the more important and responsible duties in the pharmacy and not merely for the purpose of passing examinations, we will have laid the foundation for success, both in examinations and in life.

"4. *Methods of Examination.*—While at school the student is given a number of examinations, oral and written, and his success or failure does not depend on a single trial by a strange person who holds the candidate's professional life in his hand. Furthermore, the student becomes familiar with his teacher's method of framing questions. This is not the case with the Board members. The candidate has to stand or fall on this single trial; he or she is frequently uncertain of what the examiner means by a given question. It, therefore, becomes incumbent upon the examiner to frame his questions clearly and definitely, leaving nothing to guess or imagination.

"5. *Rating Questions.*—Many examiners have a preconceived answer to their questions, either in their minds or in the form of a 'key.' This, of course, is most reprehensible, as I found from practical experience. Quite frequently the candidate's answer is by far better than the answer the examiner had in mind.

"Concluding, I wish to emphasize that greater care in the selection of students, more attention to fundamentals, frequent examinations, both oral and written, in the college, intelligently framed questions and careful scrutiny of the answers will lead to marked improvement in the result of Board Examinations."

DR. CHARTERS' COMMONWEALTH SURVEY REPORT.

BY H. C. CHRISTENSEN, SECRETARY, NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

A classic has been written. That seems a trite statement and at first flush may appear to savor of exaggeration but it is true—so true that this writer offers as his only argument in proof of the assertion, an invitation to the skeptical—if there are any such—to glance through the book.

This book "Basic Material for a Pharmaceutical Curriculum"[1] is a report of the Commonwealth Fund Study and Survey of Pharmacy over a period of nearly three years by Dr. W. W. Charters, Director, and his collaborators. It is so far-reaching in its possibilities for pharmacy that every Board member, every teacher of pharmacy, every member of the Syllabus Committee, every retail pharmacist, and every student of pharmacy—particularly every senior student—should read and study it.

Hundreds of pharmacies or drug stores in all parts of the United States, representing all classes and sections, were investigated and the duties of the pharmacist tabulated. Thousands of prescriptions were checked for ingredients, frequency of ingredients, etc., etc.

[1] McGraw-Hill Book Co., 370 Seventh Ave., New York City. Price $4.00.

From the duties which it was found the pharmacist must perform in pursuit of his vocation, it is possible to state: (*a*) the kind of qualifications he must have to perform these duties successfully; (*b*) the kind of training he should have in the college of pharmacy to give him these qualifications; (*c*) the kind of examinations which the Boards must give the applicant to test both his training and his qualifications. There is no guess-work about this report—no theorizing—just plain solid statements of supported facts. It says simply this is what the pharmacist must do—this is his job—and the obvious question is, how shall he be trained for this work—what must his qualifications be?

That colleges of pharmacy and the Syllabus Committee will make use of this report as a foundation on which to build the college curriculum goes without saying. The report comes at an opportune time because of the general adoption of the three-year course and the advent of the U. S. P. X and N. F. V.

The National Association of Boards of Pharmacy wishes at this time to direct the attention of Board members to this report. Every member of a Board should own a copy—should study it—should use it as a guide in formulating his examination questions.

Every examiner about to prepare a set of State Board examination questions is confronted with the problem: What shall I ask about—what shall the questions cover? Forthwith he must decide upon what *topics* or divisions of his subject or subjects his questions will be based. Then he must determine what the individual question will be. Common sense dictates that questions should be based upon phases of pharmacy that are the most important in the average retail pharmacy or drug store. So far as practicable, questions should be in direct ratio to the importance of the drugs, processes, etc.

Let me cite just one example: On page 212 of the report, there is tabulated a list of poisons and the frequency with which they have been used as such. This table is based upon reports of 19 coroners, 55 hospitals, 934 pharmacists, 20 physicians and 8 departments of health.

It will be noted that alcohol heads the list, next mercury, then morphine, then phenol, etc.

Under alcohol is given—ethyl, methyl, amyl, etc., etc. Under mercury—ammoniated bichloride, red oxide, etc. The individual poison claiming the largest number of victims is bichloride of mercury with 830.

From the standpoint of frequency, it is apparent that in so far as the pharmacist is called upon to render emergency treatment in cases of poisoning he would need to be prepared to cope with bichloride of mercury poisoning first. Next comes ethyl alcohol. This hardly calls for emergency treatment by the pharmacist. Then comes morphine, then phenol, then iodine, etc. So, in the order of need for skill and knowledge, we have bichloride of mercury (ethyl alcohol), morphine, phenol, iodine. Should not our examination questions be based on these in the order of their importance?

The drug ending the list of poisons is wild parsnip, with a frequency of 1 as against say, iodine 351. Surely the toxicology of iodine is the more important. I do not, of course, suggest that every examination need be headed in its Materia Medica or Toxicology by a question on bichloride of mercury, but it being established that certain poisons are more frequent and others occur seldom, our examinations

should determine the fitness of the candidate to cope with cases most frequently met.

Illustrations might be multiplied without number, but the examiner who will read the book will quickly grasp the importance of the contents of the report.

It is obvious, of course, that it would be absurd to take this report which covers the present and base our curricula and examinations thereon and then follow these indefinitely. This would be traveling the well-known circle and getting nowhere. In fact, I fear very much that that is what we have been doing. But, the value of such a survey or study being as obvious as it is for our profession, there is good reason why a similar survey should be made periodically and each new report be made the basis of new curricula and new syllabus directions. We revise our U. S. P. and N. F. every decade and our courses in pharmacy are flexed to meet the requirements of each succeeding new revision of these books. Why not have a survey made every ten years and a report of such study and survey made available at or about the time the new U. S. P. and N. F. become official?

We now need a survey to show the requirements of the commercial and administrative side of pharmacy. Well, we have opened up a big field.

GENERAL NEWS ITEMS.

New Jersey Joins National Association of Boards of Pharmacy.

The Board of Pharmacy of the State of New Jersey recently made application for membership in the National Association of Boards of Pharmacy, which has been accepted by a mail vote of the Executive Committee. The New Jersey Board is therefore now a full active member of the N. A. B. P., which membership carries with it the privilege of reciprocity to and from the other active member States, in accordance with the Constitution and By-Laws and rules and regulations of the Association.

The full membership of the New Jersey Board as well as its Secretary, Dr. Robert P. Fischelis, attended the recent meeting of District No. 2 at Philadelphia, and while there presented the application to Secretary Christensen and Lucius L. Walton, of the N. A. B. P. Executive Committee. The N. A. B. P. is to be congratulated on the addition of New Jersey to its membership roll, and in turn, heartily welcomes that State into the organization.

W. P. Porterfield, Chairman of the N. A. B. P. Executive Committee, spent Saturday afternoon, March 19th, in the Secretary's office going over various Association matters. Monday and Tuesday, May 2nd and 3rd, have been decided on as the dates for holding the N. A. B. P. Executive Committee meeting at the Chicago office of the Association.

Mr. Porterfield spent the winter in the South, as has been his custom for many years, making his headquarters at Ocean Springs, Miss. Because of pressing business interests, he returned to Fargo, N. Dak., his home, about a month earlier than usual this year.

George Judisch, of the Iowa Board, recently gave a series of lectures on Materia Medica and Toxicology before the nurses of St. Joseph Mercy Hospital, Fort Dodge. **W. W. Haire** of the same Board gave a course of lectures to the same class on Practical Pharmacy.

J. W. Gayle, Treasurer of the N. A. B. P. and Secretary of the Kentucky Board of Pharmacy, and Mrs. Gayle spent two weeks in Miami, Florida, during March.

J. G. Halbeisen, a member of the North Dakota Board, has moved his stock and fixtures from his pharmacy at Golden Valley and is opening a fine new drug store in Fargo, to be known as the Service Drug Store. His many friends wish him success.

Charles R. Maybury, Director of Washington Department of Licenses, who acts as the head of the consolidation department for that State, was married on February 10th, the bride being Miss Edna P. Crangle of Seattle. Mr. Maybury served as Chief Clerk of the House for several Republican legislatures, while Miss Crangle served as Secretary of the King County Democratic Club.

It is with pleasure that we read the good news that **Herbert M. Lerou,** Vice-President and Chairman of N. A. B. P., District No. 1, has been reappointed a commissioner on the Connecticut Commission of Pharmacy by Governor Trumbull for a term of five years commencing June 1, 1927.

Mr. Lerou was first appointed to the commission by Governor Holcomb in 1917, then reappointed by Governor Lake in 1922, this latest appointment making his third term. For nine years of the period, he has also served as Secretary of the commission.

During this term, Mr. Lerou has also been Mayor of Norwich, Conn., his home town, and President of the Chamber of Commerce, all the while operating a retail pharmacy. None of his interests has been neglected in spite of their multiplicity, as he likes being busy.

Donald S. Whitehead, a member of the Idaho Board of Pharmacy, in addition to operating a drug store in Boise, is serving a second term in the Idaho House of Representatives. He is Chairman of the Committee on Medicine, Surgery and Pharmacy. He is also serving as a member of a number of other committees—Banks and Banking; Roads, Bridges and Ferries; and State Affairs. The N. A. B. P. is proud to own such a member and by the way, he is serving as a member of the N. A. B. P. Committee on Relations of Boards with Colleges, which proves that it is the busy people who have time to do things.

It is reported in the press that H. E. Crockett, Utah Secretary of State, has resigned as Chairman of the Executive Committee of the National Association of Secretaries of State. Mr. Crockett is reported as declaring that he was forced to tender his resignation from the position mentioned, because of the action of the State legislature in eliminating all appropriations for interstate travel from the biennial budget. Mr. Crockett is said to have expressed regret at being obliged to resign, as he felt that the convention of Secretaries of State had been the means of a considerable saving to the states represented therein, and that such an organization should, for the sake of public welfare, be supported by the State to the extent of paying the expense of attending.

Many of the Boards of Pharmacy have a similar proposition to contend with, inasmuch as Board members are specifically charged under the State pharmacy laws with the protection of the public welfare. It is very essential, in order to do this properly, that the pharmacy Boards keep in touch with progress and developments in other States and this can best be done by attendance at the annual convention of the National Association of Boards of Pharmacy. When prevented from so doing because of no provision for the payment of expenses of delegates, the public is the loser of the benefit to be derived from attendance at these annual assemblies.

LEGISLATIVE NEWS.

District of Columbia.—Another name has been added to the honor roll of prerequisite States—that of the District of Columbia. The prerequisite law was passed by both the Senate and the House and signed by President Coolidge on March 4th. As it is to take effect one year from date, it will become in force on and after March 4, 1928. A provision for re-registration every three years is also included in the law.

To celebrate the victory, the Board was entertained at dinner on Friday evening, March 18th, followed by a theater party as guests of Mr. and Mrs. R. L. Quigley.

Indiana.—A new permit law has been enacted by Indiana requiring that a permit to conduct a drug store, pharmacy or apothecary must be obtained before such store can be legally operated. This law goes into effect July 1, 1927, and any store operating without a permit after that date will be in violation of the law and liable to a fine.

Another bill repealed the provision requiring druggists to file a monthly narcotic report with the Board of Pharmacy.

Iowa.—A pharmacy or drug store ownership bill, the provisions of which are a combination of the Illinois and New York laws, has been introduced in the Iowa Legislature. Secretary Eaton reports satisfactory progress and that it is expected the bill will be enacted shortly.

Kansas.—Senate Bill 221, providing that certain Boards are to turn all moneys received from licenses and renewal fees into the State treasury monthly was introduced by the Ways and Means Committee and passed the Senate. The House amended the bill to exclude the Pharmacy Board, but the Senate has refused to accept the House amendment and a conference committee is to be appointed at the request of the Senate.

Representative McCaughan has led in the fight for the exclusion of the Pharmacy Board from this provision, his contention being that the fee was imposed upon the druggists by their own action to protect and promote the profession. He has suggested a provision—that 10 per cent of the proceeds of the Pharmacy Board be paid to the State Treasury each year to cover the expense to the State of auditing the books of the Board.

Kentucky.—An appeal is being made to Kentucky pharmacists to prepare for the next session of the Kentucky Legislature in January 1928 by pledging future representatives and senators *before election* to vote for and support a bill to Limit the Ownership of Pharmacies or Drug Stores to Registered Pharmacists, according to the *Journal of the Kentucky Pharmaceutical Association*. This kind of foresightedness is commendable and should result in success.

Maine.—Edgar F. Carswell, Secretary of the Maine State Commission of Pharmacy, reports that the educational standard of that State will be raised from two years to four years of high school at the present term of the Maine Legislature, and that it is hoped to make other advances in the Maine Pharmacy Law. The present amendment includes very comprehensive definitions of the various pharmacy terms.

Missouri.—An unsuccessful attempt was made to pass a permit or drug-store registration law. The original bill was amended to such an extent that its best features were practically nullified, therefore its proponents recommended to the legislature that it be killed. A new bill embodying all the desirable features of the former bill is now pending in the House of Representatives and it is hoped that it will meet with better success.

A bill providing for the consolidation of all the examining Boards of the State under one central head, as in Illinois and Nebraska, was passed by the Senate but met with defeat in the House.

Montana.—The legislature has met and adjourned, but no legislation affecting pharmacy was proposed, for which the pharmacists of the State are thankful. Although it is felt that the present law is not perfect, in its present form it is serving the best interests of all concerned.

Nebraska.—A bill introduced in the legislature, known as H. R. 551, fostered by the Department of Public Welfare, regulates the conditions under which all the professions practice in the State. Uniformity of fees and other minor details are provided for.

A prerequisite of one year of college work for admission to the pharmacy examinations is included. While this is a disappointment to those who have been working for college graduation as a prerequisite, and it makes another variation from the uniform standard for which the N. A. B. P. is laboring, it does mean an advancing educational standard and that is the beginning of work in the right direction.

North Dakota.—North Dakota reports success in passing the amendments to its pharmacy law as reported in the last issue of our Department.

Ohio.—A bill to amend the pharmacy law is pending in the legislature which includes the following:

A provision requiring the physical presence of a registered pharmacist at all times in a drug store or pharmacy;

A provision for permit and annual re-registration of stores;

Definition of pharmacy;

The granting of a dealer's permit for the sale at retail of proprietary and patent medicines and certain specified household remedies when put up in packages;

Authority is given the Board to make rules and regulations for the violation of which a permit may be suspended or revoked, and provides penalties for violations of all provisions.

Oklahoma.—House Bill No. 1234 which provides for payment of all moneys received by the Board of Pharmacy into the State Treasury and an appropriation by the legislature of all moneys necessary to cover the expenses of the Board is pending before the legislature.

An attempt was also made to require a $10 license fee from all dealers, other than druggists, selling patent or proprietary medicines, but was finally abandoned.

STATE BOARD OF PHARMACY NEWS ITEMS.

Alabama.—W. E. Bingham, Secretary of the Board of Pharmacy, is making a tour of the State inspecting drug stores. He covered 64 stores in North Alabama the week of March 7th, and will continue the work just as fast as his duties at the office will permit.

Connecticut.—Only two candidates out of a class of forty examined at the January meeting of the Board were successful in passing.

District of Columbia.—Dr. L. F. Bradley, a member of the D. C. Board of Pharmacy, has been appointed Dean of the School of Pharmacy of George Washington University to fill the vacancy caused by the demise of Dr. Kalusowski. The members of the Board as well as the faculty of the school are coöperating with Dean Bradley in formulating a program for a three-year pharmacy course. It is hoped that the outline will be ready in time to be included in the prospectus for 1927–1928, which soon goes to press.

Idaho.—An analysis of the list of pharmacists in Idaho discloses that of 439 licenses issued when the State law became effective in 1905, 175 are still in force. There are now 670 pharmacists registered in the State, of whom 424 are residents. Three of this number are assistant pharmacists.

Iowa.—The Board has changed its examination dates to the following—the third Wednesday and Thursday of March and November, and two June examinations, one at Des Moines and the other at Iowa City.

Kansas.—Eleven candidates out of twenty-six taking examination for registration as pharmacist on February 2nd and nine out of fifteen taking examination for registration as assistant pharmacist were successful in passing.

The next examination of the Board will be held in Lawrence on May 4th and 5th.

Massachusetts.—Twenty-three of the fifty candidates taking the January Board examination were successful in passing and have been granted certificates of registration.

Mississippi.—Within a short time, the meeting of the faculty of the School of Pharmacy of the University of Mississippi and the members of the State Board of Pharmacy will undoubtedly take place. It should prove to be of incalculable value by revealing the weak points in each side that can be strengthened, thus leading to a better understanding of common problems.

The members of the Board as well as the pharmacists of the State generally are rejoicing in the report that Dr. E. F. Kelly, Secretary of the AMERICAN PHARMACEUTICAL ASSOCIATION, is to be a noted speaker at the Mississippi Pharmaceutical Association meeting to be held at Meridian, Miss., in June. In addition to his prominence in pharmaceutical affairs, Dr. Kelly is a man quite capable of putting over any message that he may select.

New Jersey.—Governor Moore has appointed Dean B. Crawford of Atlantic City, N. J., to succeed Daniel H. Hills, of Spring Lake, N. J., when the latter's term expires on May 31, 1927. Mr. Hills has served two five-year terms and is President of the Board at this time.

New Mexico.—An active campaign is being carried on for enforcement of the Pharmacy Law. A number of prosecutions are expected to be filed and should result in better conditions in the profession throughout the State. All registered pharmacists are urged to report violations known to them in their respective sections of the State to aid in this campaign.

The next meeting of the Board is called for May 23rd and 24th at Albuquerque.

Ohio.—Two appointments to the Ohio Board of Pharmacy were recently made by Governor Donahey—A. L. Flandermeyer of Cleveland and Ralph C. Knisely of Ravenna.

Ralph C. Knisely is a new appointee and is a graduate of the University of Pittsburgh, Department of Pharmacy, class of 1908, and has owned and conducted a retail pharmacy in Ravenna, Ohio, since 1917.

By the appointment of Mr. Flandermeyer, we welcome back an old friend, as he was originally appointed a member of the Ohio Board by Governor Harmon in 1911, and reappointed by Governors Willis and Cox, serving until 1921. His present term expires March 1932. Mr. Flandermeyer is a graduate of Purdue, class of 1900, and has served as a trustee of the Cleveland School of Pharmacy, and is a prominent member of various pharmaceutical organizations. He is a member of the firm of Flandermeyer and Gerlach, conducting a retail pharmacy at 3390 W. 25th St., Cleveland.

South Carolina.—Seven out of ten applicants taking examination for registration as pharmacist were successful in passing.

The Board will meet again June 6th and 7th at Myrtle Beach, and the State association will hold its annual meeting on the two days following.

South Dakota.—The right of persons, other than pharmacists, to sell patent or proprietary medicines are being tested in the South Dakota courts. Although the law of the State provides

that no one other than a registered pharmacist may sell and dispense drugs and medicines, a lower court recently sustained a demurrer filed by an attorney for a dealer who had been arrested for a violation.

As a result, not only proprietary medicines, but all package drugs are being sold by dealers other than retail pharmacies or drug stores. If a ruling is obtained from the Supreme Court upholding the pharmacy law, it will result in a rigid enforcement.

Utah.—J. L. Franken of Salt Lake City, a member of the Utah Board of Pharmacy for 28 years and for 20 years its President, has resigned and expects to spend several months in Honolulu.

Governor George Dern has appointed former Congressman Milton H. Welling of Fielding, to the position of Director of the Department of Registration, succeeding James T. Hammond. The director is the executive head of the consolidation department in charge of all the examining boards in the State. Inasmuch as all terms of office of Board members automatically cease on the appointment of the new director, it is expected that there will be at least several changes in the membership of the Board.

Francis J. Hedquist, a member of the Utah Board of Pharmacy and prominent in pharmaceutic affairs of that State, met a sudden death while at work in his store in Provo, Utah, on March 4th. He fell from a stool to the floor in a faint, suffered bad bruises and possibly concussion of the brain, and died a short time later.

Vermont.—The annual meeting of the Board was held at the State House in Montpelier on Feb. 2nd. The following officers for the ensuing year were elected: *President*, Fred W. Churchill; *Secretary*, Fred D. Pierce; *Treasurer*, Harris W. Alexander.

Eleven out of twenty-one candidates taking examination for registration as pharmacist at the February meeting were successful in passing.

It was voted to hold examinations on the first Wednesday of June and October.

William G. Saunders, of Lyndonville, has been appointed to succeed Floyd G. Russell of Barre, whose term expired recently.

THE WASHINGTON CHERRY TREES.

Because of the interest of the late Dr. Jokichi Takamine (member of the AMERICAN PHARMACEUTICAL ASSOCIATION for a number of years, until his demise), the Potomac basin of Washington is beautified by the Japanese cherry trees, which attract visitors from all sections of the country.

BI-CENTENARY OF SIR ISAAC NEWTON'S DEATH.

On page 595 of the July number of the JOURNAL, A. PH. A., for 1926, copy of Sir Isaac Newton's autograph will be found. While attending the village school at Grantham he lived in the home of the village apothecary, Mr. Clark, and assisted him in the every-day duties of the shop and received instruction in the art of pill-making. He himself said that working with mortar and pestle, cutting the pills in exact cubes, and then rolling one in each hand between thumb and finger, did him a lot of good whether the patients were benefited or not. Mr. Clark explained to the embryo scientist that "pills were for those who made and sold them, and if they did no harm to those who swallowed them, the whole transaction was then one of benefit." In his host's library Newton found scientific treatises, which "inspired him with that love for higher mathematics which became the ruling passion of his life." During these earlier years he also constructed a horseless carriage which was propelled by a crank and pumping device.

It was during an extended absence from Trinity, on account of an epidemic, that Newton—at his birthplace (his mother's home) Woolsthorpe—was led to his studies on gravitation by the observation of a falling apple and here also, during the same period, he discovered the prismatic colors of light.

Newton contended that transmutation of metals was a possibility. Like every one who has accomplished great things, he did not escape calumny; such terms as upstart, pretender, falsifier, etc., were applied to him, but his preëminence as a scientist was generally acknowledged during his life-time; in fact, from youth up his superior mind made him an outstanding character in student and national life.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

THE MANUFACTURE OF DILUTED HYDRIODIC ACID. A DEMONSTRATION AT THE LABORATORY CONFERENCE.*

BY SAMUEL SHKOLNIK.

The instruction given in the manufacturing laboratory at the University of Illinois School of Pharmacy correlates the work for the student, for if the student is left to do this for himself he may not use the information so as to intelligently carry out his practice of Pharmacy. The method which is employed by Prof. Clyde M. Snow is to present in lecture form the theoretical discussions of preparations which are to be actually manufactured the week following in the pharmaceutical laboratory. These theoretical lectures are presented twice a week and in every case, when possible, actual demonstrations of the chemical reactions and of the processes of manufacturing in general are made at the lecture stand. Such an arrangement gives the student an opportunity to review the lecture notes and study the preparation which is to be manufactured in the laboratory.

Although a practical demonstration at the lecture stand impresses the student, his attention is held only temporarily and it is therefore advisable and even necessary to precede the manufacturing exercise in the pharmaceutical laboratory by a detailed discussion of the process, chemical reactions and technic involved. Such preliminary discussion fills about an hour, after which follows a three-hour period of actual manufacturing work.

As a teaching demonstration at this laboratory conference I selected the discussion of the manufacture of Diluted Hydriodic Acid, which is a preparation manufactured by our freshmen students and one which is typically outstanding from a pharmaceutical chemistry standpoint, because of the particular ingredients used and the chemical changes involved in its manufacture. During the first hour of the preliminary discussion one student is called upon to read before the class from the laboratory manual the official formula and method of preparation of Diluted Hydriodic Acid. This alone, however, does not inform the class of the "Whys" and "Hows" and if left to go on with the exercise the students would merely be following the directions outlined without any scientific visualization—thus lacking the essential element which distinguishes the educated pharmacist from the so-called pharmacist.

Originally, Diluted Hydriodic Acid was prepared by passing Hydrogen Sulphide into Iodine and water according to the following equation: $2I_2 + 2H_2S = 4HI + S_2$. Andrew Buchanan of Glasgow prepared Diluted Hydriodic Acid extemporaneously by dissolving Tartaric Acid and Potassium Iodide each in water and mixing the two solutions and filtering and adding enough water so that each fluid drachm contained the equivalent of 5 grains of Iodine. Dunn's later modification was to cool the mixture and add enough water so that each fluid drachm contained the equivalent of 10 grains of Iodine. The present U. S. P. method is based on the old Buchanan process with some modifications.

* Presented before the Section on Pharmacy of the American Association of Colleges of Pharmacy, Philadelphia, September 1926.

The U. S. P. X formula for Diluted Hydriodic Acid calls for 135 Gm. of Potassium Iodide to be dissolved in 250 cc. of distilled water and 122 Gm. of Tartaric Acid to be disolved in 400 cc. of Diluted Alcohol. These two solutions are then mixed well and cooled at 5° C. for 2 hours. Upon mixing the two solutions double decomposition takes place between the tartaric acid or hydrogen tartrate and the KI producing hydrogen iodide and potassium acid tartrate or potassium bitartrate as an insoluble by-product according to the following equation: $KI + H_2C_4H_4O_6 = HI + KHC_4H_4O_6$. The HI itself is a heavy gaseous compound which disolves in the water present and forms Hydriodic Acid. The above reaction goes to completion because the by-product potassium acid tartrate is an insoluble salt and, of course, is precipitated as fast as formed, particularly so when the liquid is alcoholic and cold; hence the explanation for cooling the mixture of the two solutions for 2 hours. This reaction will go to completion whenever one of the products formed is an insoluble and hence un-ionizable substance.

The HI formed ionizes into positive hydrogen ions and negative iodine ions, but the potassium bitartrate being insoluble does not ionize and, therefore, there are no potassium ions in solution which could combine with the iodine ions and no tartrate radical ions which could combine with hydrogen ions and cause the reaction to reverse; hence all the potassium is precipitated as potassium bitartrate or potassium acid tartrate which is removed by the process of filtration and all the iodine remains in solution in the form of hydrogen iodide.

The question that usually arises at this point is, could HI be made from any other iodide than KI? Here the student ordinarily seeks a "cut and dried" unqualified answer. But it is another one of those cases where neither "Yes" nor "No" without any further qualifications will suffice as a satisfactory answer. While HI could be prepared from any other soluble iodide, such as sodium or lithium iodide, KI is used because the resulting by-product is insoluble and can be readily removed by filtration which would not be the case if sodium or lithium iodides were used, for the bitartrate of these metals is soluble. Similarly, in reply to the question whether HI could be made from any acid other than tartaric the same explanation could be advanced, that is—any acid which will react with the KI will furnish HI but tartaric acid is selected because the tartrate radical, combining with the potassium from the KI, forms an insoluble potassium salt, namely potassium bitartrate; all other salts of potassium are soluble and, therefore, no other acid radical would form an insoluble by-product with the potassium. Of course, the use of sulphuric acid would be objected to on two grounds: First the by-product formed would be potassium sulphate or potassium acid sulphate, as the case may be, both of which are soluble and, therefore, could not be separated by filtration. Second, sulphuric acid, being an oxidizing agent, would oxidize the HI as fast as formed, liberating free iodine by changing the valence of sulphur from +6 to +4, +2, or even neutral, and raising the valence of Iodine from −1 to 0.

Having explained why the two particular chemicals KI and tartaric acid were chosen there remains another peculiarity which should not be overlooked and that is the different solvents used. We know that KI is rather insoluble in alcohol (1:25) or alcoholic liquids but is readily soluble in water (1:0.7), hence the explanation for dissolving the KI in water. But we also know that tartaric

acid is soluble in both water and alcohol and now the question arises why is the tartaric acid dissolved in Diluted Alcohol and not in water, as such, or alcohol, as such? Understanding that the KI is rather insoluble in alcohol we could reasonably expect that if the tartaric acid were dissolved in alcohol, as such, and mixed with the aqueous solution of KI, a portion of the KI, at least, would be thrown out of solution and result in a deficiency of HI to be produced. On the other hand the introduction of alcohol is desirable to completely precipitate the by-product—potassium bitartrate—which is more insoluble in alcoholic liquids than it is in aqueous; hence, the explanation for dissolving the tartaric acid in Diluted Alcohol which, being alcoholic, aids in the precipitation of the potassium bitartrate and yet it is not too strongly alcoholic to throw out potassium iodide from solution.

A similar explanation is offered for washing the precipitate of potassium bitartrate with Diluted Alcohol, that is, the HI which is retained by the precipitate (and for the purpose of obtaining it the precipitate is washed) is dissolved out by Diluted Alcohol without carrying with it any of the undesirable potassium bitartrate as would probably be the case if water alone were used; for the insolubility of potassium bitartrate is greater in alcoholic liquids than in aqueous.

Since the introduction of the Diluted Alcohol is for no other reason than to aid complete precipitation and removal of the by-product, potassium bitartrate, we can readily understand why the U. S. P. directs to heat the filtrate on the water-bath until all of the alcohol is evaporated, for after the alcohol has accomplished the purpose for which it was used, before filtration, it is of course not wanted in the finished product, the latter being an aqueous preparation. The loss in weight, resulting from the evaporation of the alcohol, however, must be replaced by water, otherwise the finished product will be more concentrated and contain more HI than the formula calls for—that is, the ingredients are used in such proportions as to produce just enough HI to form a thousand Gm. of an approximately ten per cent aqueous solution.

Hydrogen Iodide is not a very stable compound, for it is a comparatively strong reducing agent and is, therefore, readily oxidized even by the oxygen from the air to free iodine and water according to the following equation: $4HI + O_2 = 2H_2O\ 2I_2$—the Iodine changing from the valence of —1 in HI to neutral in elemental iodine while the valence of oxygen is changed from neutral in its elemental state to —2 in water. To prevent, or at least retard, such decompositon a preservative must be used and 20 cc. of hypophosphorous acid are employed for that purpose. The hypophosphorous acid prevents, in a measure at least, the oxidation of the HI to free iodine, because it is a stronger reducing agent, comparatively, than HI, and therefore if any oxidation is to take place it will be oxidized first, and the HI will not be affected until all of the phosphorus in the hypophosphorous acid is oxidized. This is explained by the fact that the phosphorus in the hypophosphorous acid exists in a +1 valence and in this state phosphorous is very unstable tending to oxidize to a +3 or +5 valence which are the more stable forms of phosphorous. This tendency of phosphorus to change from a +1 to a +5 valence is much greater than the tendency of the —1 iodine is to change to neutral elemental iodine. It is also said that the storing of the Diluted Hydriodic Acid in light-colored bottles in diffused light will retard the oxidation of the hypophosphorous

acid and the hydrogen iodide (light being a reducing agent) and the preparation will keep for six months under those conditions.

In the U. S. P. IX Hypophosphorous Acid in substance was not used but 10 Gm. of potassium hypophosphite were dissolved together with the potassium iodide in water and then mixed with the tartaric acid. Here again double decomposition took place between the potassium hypophosphite and tartaric acid or hydrogen tartrate, producing hypophosphorous acid or hydrogen hypophosphite and potassium bitartrate as a by-product which was precipitated and removed by filtration. In this process, of course, more tartaric acid had to be used for it had to serve the purpose of furnishing hydrogen ions to form HI with the iodide from the KI and also hydrogen ions to combine with the hypophosphite radical from the potassium hypophosphite to form hypophosphorous acid. This latter reaction is obviated by the use of hypophosphorous acid in substance and therefore the U. S. P. X formula directs the use of 122 Gm. of tartaric acid instead of 136.5 Gm. as was directed in the U. S. P. IX.

The Diluted Hydriodic Acid, as all other iodides, is used internally as an alternative in 0.5 cc. doses and it also enters into the preparation of the U. S. P. Syrup of Hydriodic Acid. The liberation of free iodine, therefore, renders the preparation unfit for use, for iodine is very irritant and, if taken internally, would produce its irritant effect on the gastro-intestinal tract. It is for this reason that the U. S. P. states that this preparation should not be dispensed if any free iodine is present. It also gives a test for the detection of free iodine by adding a few drops of Starch Test Solution to 5 cc. of the acid producing a blue-black coloration of starch iodide; formed if free iodine is present. The test, of course, must be negative and show absence of iodine in order to conform to the U. S. P. standards. Since the liberation of free iodine is objectionable, for the reasons already explained, it necessarily follows that Diluted Hydriodic Acid is incompatible with oxidizing agents such as nitrates, permanganates, chlorates as well as ferric, cupric and mercury salts, all of which are capable of liberating free Iodine from hydrogen iodide changing the valence of the Iodine from —1 to neutral while they are reduced to a lower valence such as ferric to ferrous, cupric to cuprous, etc.

The Assay Process is not discussed in the laboratory at the present time, for as I pointed out before, this preparation is manufactured by the freshmen students who have no knowledge of assay processes—Assaying being one of the subjects taught in the second year. But as far as the manufacturing of the preparation is concerned, the students are thoroughly informed at this time, so that they can understand and explain why the particular ingredients were selected, what chemical reactions took place in its manufacture, and why the preparation was put together in the directed order. A knowledge of this kind not only makes the exercise more interesting by having the students understand every detail of the process, but also creates in the operators a confidence in the product which they manufacture—a knowledge which is essential to intelligently practice the profession of Pharmacy and one which is symbolic of an educated pharmacist.

Send in your ballot on the Headquarters site, if you have not done so—your vote evidences your interest.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

Article IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meetings of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter.

BALTIMORE.

The March meeting of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Emerson Hotel on Wednesday evening, March 30, 1927, Dr. L. M. Kantner presiding.

Dr. R. H. Riley, Chief of the Bureau of Communicable Diseases of the Maryland State Department of health was the speaker, having for his subject "Public Health Administration in Maryland."

He reviewed the history of the establishment of the State Department of Health, mentioning that the first law was enacted in 1865, and provided for the registration of births, deaths and marriages. Then followed the law of 1874, which outlined practically the program followed to-day.

The speaker outlined what has been accomplished through the years in the matter of purified water supply, the pasteurization of milk, vaccination against smallpox, reduction of cases of diphtheria and typhoid, and of the lessening of diseases in school children through observation and early medical attention, and of the effort being made to increase the general individual health by more frequent medical examinations.

He stated that the primary function of the State Department of Health had been the prevention of epidemics, in which it had been successful, and the extension of human life, mentioning that the expectations of life had been increased from 40 years in 1865 to 58 years in 1927.

Charts were exhibited showing a great reduction in the number of deaths from the diseases of infants, from tuberculosis, diphtheria, and communicable diseases, Dr. Riley stated that the diseases of middle age—heart disease, nephritis, etc., were the ones now increasing in number.

He named the different bureaus and departments of the State Board of Health, with their respective functions, and paid high tribute to those who had directed the work of the Board for many years.

A rising vote of thanks was tendered Dr. Riley for the able and interesting presentation of the subject. Mention was made that Dr. John B. Thomas was ill, and in appreciation of the interest and coöperation he has ever manifested in the Baltimore Branch, as well as in the parent Association, it was unanimously voted to extend greetings and sincere wishes for a speedy and complete recovery.

The enjoyment of the evening was much enhanced by violin solos by Mr. Richard Mossop who was accompanied at the piano by Mr. Harry Lehne.

Mr. Charles Stevens will be the speaker for the April meeting of the Branch.

B. OLIVE COLE, *Secretary-Treasurer.*

CHICAGO.

The 165th meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION, Chicago Branch, was held at the University of Illinois School of Pharmacy, Friday evening, March 18, 1927.

The meeting was called to order by President E. N. Gathercoal. The following resolution was presented by Dean W. B. Day and unanimously approved.

WHEREAS, a deplorable accident, resulting in the death of six infants, has recently occurred in a hospital in this city, and

WHEREAS, it appears that this accident was due to the failure of a nurse to label a poisonous antiseptic solution, and

WHEREAS, we are informed that Health

Commissioner Bundesen and Coroner Wolff have taken steps to prevent such accidents in the future, therefore,

Be It Resolved that the Chicago Branch urges that the dispensing and compounding of drugs and medicines in hospitals should be supervised as far as possible by a qualified Pharmacist and further, that we commend the Health Commissioner and Coroner for the prompt action they have taken toward lessening accidents of this kind.

President Gathercoal then presented S. L. Antonow, attorney and pharmacist, who spoke on the subject "Common Legal Problems of the Pharmacist." Owing to the enormous number of legal problems confronting the pharmacist they were divided into the following four groups—

(1) The Federal laws regarding the sale of narcotics and intoxicating liquors, and statutes covering the mailing of certain drugs and sundries.

(2) The State laws concerning applications for registration and the sale of drugs, poisons and liquors.

(3) The City ordinances governing licenses, and the sale of drugs, poisons and sundries.

(4) Potential liability arising from the compounding of drugs and the sale of drugs to the public. Various actions that may arise under an alleged claim of an error in the compounding of a prescription or in the dispensing of a drug different than the one that the prospective purchaser ordered. Emphasis was placed on the necessity of exercising the greatest degree of care in compounding or dispensing drugs and quoted many cases where claims were made following an error in dispensing. He stated that it is no defense to be a competent registered pharmacist, but the test is whether or not there was negligence on the part of the pharmacist. Failure of labeling and sale of drugs by unregistered clerks are both conclusive evidence of negligence.

He also pointed out the necessity of pharmacists to understand thoroughly the conditions on contracts or notes for purchase of goods, quoting many instances of such carelessness by the pharmacist.

Secretary S. C. Henry of the N. A. R. D. then spoke on the Federal regulations regarding intoxicating liquors and narcotics. He urged that pharmacists take an active part to have their senators and representatives in Congress correct the present regulations regarding liquors and narcotics. He also urged the pharmacist to understand thoroughly all contracts and notes before signing on the dotted line in order to prevent later legal difficulties.

V. C. Michels, superintendent of registration in Illinois, gave an interesting talk on the requirements for registration of pharmacists and pointed out the need for lengthening the study of pharmacy in order to raise the standards as a profession. Reasons were presented why the article of drugs and medicines should be restricted to drug stores.

Mr. Shkolnik gave a review of the City ordinances which the pharmacist should know, and a general discussion of various regulations. Illustrations were given where a pharmacist may recommend a preparation for a certain ailment but cannot diagnose and prescribe for the purchaser.

A general discussion followed in which many of the common problems of those present were answered. Mr. Kolb mentioned the necessity of inquiring into the use of a drug requested by a purchaser, in cases of doubt, in order that the correct substance is dispensed. Others contributing to the discussion were Messrs. Becker, Gray and Snow.

A rising vote of thanks was tendered the speakers for their excellent talks.

S. W. MORRISON, *Secretary.*

DETROIT.

The March meeting of the Detroit Branch, AMERICAN PHARMACEUTICAL ASSOCIATION, was held Thursday, March 12, 1927, in the new Headquarters of the Wayne County Medical Society. The dinner which preceded the meeting was well attended, Prof. Leon M. Monell, of Buffalo University, was present.

President Rowe called the meeting to order at 8.00 P.M. The minutes of the previous meeting were read and approved. The speaker of the evening was Dr. Noah E. Aaronstam, who gave an interesting talk on his experiences in prescription writing during a period of twenty-five years. He said Pharmacy was practiced by the ancient priests until the priests became men of God, and the physicians became men of men, then Pharmacy became a distinct profession. He compared the pharmacists of old who did all their manufacturing with the pharmacists of to-day many of whom buy everything they use. He questioned whether Pharmacy to-day was a profession. He also deplored the lack of support given to the Metric System by pharmacists as well as

by physicians, and said that until the Government made it the standard we could expect very little support for the general adoption of this superior system. He criticized the manufacturer for the many preparations on the market.

A general discussion followed, led by Messrs. Seltzer, Hall and Weaver. They defended the pharmacist of to-day and pharmacy as a profession. Prof. Monell assured the speaker that pharmacists favored the Metric System, but out of 10,000 prescriptions only 9.8% were written in that system. This survey was made from coast to coast. He also defended Pharmacy as a profession. He said his source of information came from the U. S. Department of Health. President Rowe also quoted an article of a recent issue of the JOURNAL crediting Pharmacy as a distinct profession.

Mr. Lyons defended the manufacturers of pharmaceuticals. He said their methods of manufacture and standardization were far beyond those employed in the average Pharmacy, because of equipment.

After Dr. Aaronstam answered the many questions put to him, Mr. Seltzer moved a rising vote of thanks for the speaker, seconded by Mr. Scoville—it was carried.

BERNARD A. BIALK, *Secretary.*

NEW YORK.

The March meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was largely attended and among those present there were a number of physicians. The subjects of the evening were "The Theory and Art of Pharmacopœia Revision in the Interest of Pharmacy" by Dr. H. H. Rusby, and "The Present Trend in Medicine" by Dr. Harlowe Brooks, well-known medical authority.

The following resolutions were unanimously adopted:

1. *Resolved*, that the term "pharmaceutical necessity," as used in the U. S. P. shall be construed as meaning that the book shall include all articles that the professional pharmacist is commonly expected to supply; that in place of the term "proved therapeutic usefulness" there be substituted that of "common therapeutic use;" that the U. S. P. should contain standards for all crude drugs and similar legitimate medicinal articles believed by the Committee on Revision to be sold in twenty-five per cent, or more, of the pharmacies or drug stores of the United States, in their crude condition, or in the form of preparations, or of both.

2. *Resolved*, that we use our best efforts to secure the appointment of delegates to the next Pharmacopœial convention who shall go instructed to secure the adoption of this resolution, or one of similar purport, as a basic rule of procedure for the next Committee of Revision.

PHILADELPHIA.

The March meeting of the Philadelphia Branch of the AMERICAN PHARNACEUTICAL ASSOCIATION was held Tuesday evening, March 8th, at the Touraine Apartments Restaurant.

This meeting was one of the most enjoyable occasions that the Branch has had in a long time as it was the annual gathering at which the Past-Presidents are always guests of the branch. A large number of the members, their wives and friends were present and the meeting proper followed a most delicious dinner.

At the close of the dinner Miss Jane Hendrickson rendered a very delightful piano solo and as an encore gave a short reading.

The President then called upon Dr. William Krusen, Director of Public Health, who gave a most interesting talk on "The Pharmacist as a Public Health Servant." Dr. Krusen laid special emphasis upon the relationship and the mutual understanding and coöperation which is necessary between physician and pharmacist, urging that this coöperation be given between the two professions. He stated that the public at large would much rather listen to the advice of a pharmacist upon matters of public health than they would to a physician, as many times they felt that a physician had some ulterior motive in mind, and in view of this the pharmacist held an extremely important position in every community. Pharmacists in their altruistic way, rendered a valuable service in helping humanity avoid and avert disease and thus to carry on. He spoke in a very interesting way of the advances being made in medicine to-day and said that no matter what the progress of medicine might be, no matter how many serums and similar products might be developed, that there would still be very definite need for pharmacists to help in the preparation of these products, and the various items which would be needed in connection with them.

A rising vote of thanks was given to Dr. Krusen for his most valuable and entertaining talk and the hope was expressed that he

might be able to attend more of the Local Branch meetings in the future.

The Secretary read several pieces of correspondence and presented the names of I. M. Ostrum and Robert Rowen for membership. These two gentlemen were accepted as Branch members, pending their acceptance by the parent body.

The Treasurer reported that following the action taken at the February meeting, $400.00 had been deposited in the savings account at the Central Frust and Savings Co., 4th and Market Sts., this account to be held in the name of the Philadelphia Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION and under the combined control of the President and the Treasurer.

The President then called upon the former Presidents of the Branch and the following responded, each in turn giving a few interesting and entertaining remarks: W. A. Pearson, F. E. Stewart, Ambrose Hunsberger, W. W. McNeary, Ivor Griffith, B. C. Goodhart, J. W. England, J. W. E. Harrisson and Mort M. Smith.

In the absence of Chairman Stroup, Prof. Leo G. Penn reported that the auditing committee had found both the account of the Treasurer of the Local Branch and the account of Treasurer Peacock's entertainment committee for the A. PH. A. convention correct to the best of their knowledge and belief.

As this concluded the work of Mr. Peacock's committee the report of the committee was received and the committee discharged with thanks.

Chairman Ambrose Hunsberger made the following report for the committee on nominations: For *President*, Raymond Hendrickson; *First Vice-President*, Arno Viehoever; *Second Vice-President*, Elmer Michener; *Secretary and Treasurer*, Adley B. Nichols; *Delegate*, J. C. Peacock. Upon motion, Ivor Griffith cast an unanimous ballot for the above nominees after which President Cliffe declared them to be elected and he then turned over the chair to the incoming President.

Mr. Cliffe thanked the members of the Branch for their coöperation in helping to make this year a banner year. Mr. Hendrickson asked that the same coöperation be given him during the coming months and stated that he would do all in his power to further the interests of the Branch.

A rising vote of thanks was given to the retiring officers and to the Secretary and Treasurer.

ADLEY B. NICHOLS, *Secretary*.

PITTSBURGH.

The March meeting of the Pittsburgh Branch of the A. PH. A., was held at Webster Hall, Tuesday evening March 15, 1927, President Frank S. McGinnis presiding.

The meeting was preceded by a dinner and, in point of numbers, was the largest of recent gatherings of the Pittsburgh Branch. The members of the Junior Class had been invited to be present and many availed themselves of the privilege. About 80 persons were present at the dinner, many others coming in time for the meeting.

The topic of the evening was a debate by teams selected from the Junior Class, on the subject, "Resolved That Price Maintenance Is a Good Thing for the Retail Druggist."

The debate was in charge of C. Leonard O'Connell, lecturer in Pharmaceutical Economics at the Pittsburgh College of Pharmacy.

The affirmative side was presented by Richard Mattern, Louis Cozier and Sidney Klein; the negative by Charles N. Jenkins, Scott W. Morris and Francis B. Carroll.

Each speaker required approximately fifteen minutes to present his argument, and about the same length of time was given each side for rebuttal.

The judges were Dean J. A. Koch, Dr. Louis Emanuel and R. R. Gaw.

At the close of the general debate, while the judges were deliberating over the verdict, the time was occupied by a general discussion.

The verdict by the judges was rendered in favor of the affirmative.

LOUIS SAALBACH, *Secretary*.

AMERICAN HISTORICAL ASSOCIATION.

Gifts of $150,000 have been announced by the American Historical Association which is seeking to raise an endowment of $1,000,000. The endowment committee is seeking to establish a fund for promoting American history and history in America. Former U. S. Senator, Albert J. Beverage, is the Chairman of the Association.

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1926–1927.

Office of the Secretary, 10 West Chase St., Baltimore, Md.

LETTER NO. 8.

March 11, 1927.

To the Members of the Council:

80. Permission to Use the Text of the N. F. V. Motion No. 23 (See Council Letter No. 7, page 170) has been carried and Dr. George E. Rehberger has been so advised.

81. Ebert Prize Medal. Motion No. 24 (See Council Letter No. 7, page 171) has been carried and Prof. John Uri Lloyd has been so advised.

82. Election of Members. Motion No. 25 (See Council Letter No. 7, page 171), *Motion No. 26* (See Council Letter No. 7, page 46), and *Motion No. 27* (See Council Letter No. 7, page 172) have been carried. Applicants for membership numbered 93 to 107 inclusive, applicants for membership numbered H-246 to H-273 inclusive, and applicants for Life Membership numbered L. M., 2 are therefore declared elected.

83. Local Secretary for 1926–1927. No nominations have been received in addition to that made in Council Letter No. 7, page 170.

(*Motion No. 28.*) *It is moved by Kelly that A. W. Pauley of St. Louis, Mo., be elected Local Secretary of the American Pharmaceutical Association for 1926–1927.*

84. Applications to Use the Text of the N. F. V. The following communication has been received by Chairman A. G. DuMez of the Committee on Publications:

> "I have gone over the request of Prof. Hugh C. Muldoon to use portions of the text of the National Formulary V in a textbook on Organic Chemistry, and that of Adrian T. Ward to use portions of the text for comment in a small booklet entitled 'Concise Questions and Answers on Pharmacy.'
>
> "The material used is so small and the way in which it is used is so restricted that I can see no objection to granting permission for its use in these books.
>
> "I, therefore, recommend to the Council that permission be granted to these parties to use portions of the text of the National Formulary V for comment in the publications mentioned, and that the minimum fee of $5.00 be charged for this purpose."

(*Motion No. 29.*) *It is moved by DuMez that Hugh C. Muldoon of Pittsburgh, Pa., and Adrian T. Ward of North Conway, N. H., be granted permission to use the text of the N. F. V for partial reproduction in a textbook on "Organic Chemistry" and in "Concise Questions and Answers on Pharmacy" respectively, and at the usual charge of $5.00 in each case.*

85. Increase in Budget Appropriation for the Drug Trade Bureau of Public Information. Dr. R. P. Fischelis, Chairman of the Committee on Coöperative Publicity and the A. PH. A. Representative in the Bureau, and the President of the Bureau, has requested that the Budget Appropriation of $200 for 1927 (See Council Letter No. 5, page 81, item No. 23) be increased to $400. This request was submitted to the Committee on Finance and Chairman Koch of that Committee advises that "The Committee on Finance approves an addition of $200 to the appropriation for the Drug Trade Bureau of Public Information."

The appropriation to the Bureau in the Budget for 1926 was increased from $200 to $400 and the members of the Council are referred to Council Letter No. 9 (1925–1926) as given on page 307 of the April 1926 issue of the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

(*Motion No. 30.*) *It is moved by Fischelis that the appropriation of $200 in the Budget for 1927 for the Drug Trade Bureau of Public Information be increased to $400.*

86. Applicants for Membership. The applications properly endorsed and accompanied by the first year's dues have been received.

No. 108, Elhamy B. Absoud, The Central Pharmacy, Fayoum, Egypt; No. 109, Murray Breese, 119 W. 40th St., New York, N. Y.; No. 110, Ray C. Gable, 5216 Morris St., Philadelphia, Pa.; No. 111, Louis C. Haguy, 463 Central Ave., Newark, N. J.; No. 112, Robert W. Hale, 6104 Walnut Lane, Cedarcroft, Baltimore, Md.; No. 113, Milton J.

Harnist, 368 87th St., Brooklyn, N. Y.; No. 114, Ellery Hale Harvey, 6103 Ingleside Ave., Chicago, Ill.; No. 115, Harold George Hewitt, 3435 Main St., Buffalo, N. Y.; No. 116, Benjamin Ellis Holsendorf, U. S. Quarantine Station, Rosebank, Staten Island, N. Y.; No. 117, Ray J. Hornfeck, 1706 Soles St., McKeesport, Penna.; No. 118, J. H. Huntoon, 418 S. Garden St., Visalia, Calif.; No. 119, Dayle V. Kretzinger, 1262 West Decatur St., Decatur, Ill.; No. 120, T. A. Libbus, Chapel Hill, N. C.; No. 121, Thomas John Mack, 194 10th St., Troy, N. Y.; No. 122, Harry William Mantz, 2217 S. Broad St., Philadelphia, Pa.; No. 123, Frank Marion, 604 West 191st St., New York, N. Y.; No. 124, J. H. Marshall, 26 Hennepin Ave., Minneapolis, Minn.; No. 125, Thomas William McKay, 30 Main St., Camden, Maine; No. 126, Cora Miltmore, Library, College of Pharmacy, University of Florida, Gainesville, Fla.; No. 127, F. W. Mueller, 321 So. Park Ave., Oshkosh, Wis.; No. 128, Samuel Ostrow, 201 W. 154th Place, Calumet City, Ill.; No. 129, Otto W. Schmidt, 26 Holmes St., Youngstown, Ohio; No. 130, Norman Simpson, 1321 Bellvidere, Detroit, Mich.; No. 131, Dudley Gutman Singer, 1000 Pacific Ave., Atlantic City, N. J.; No. 132, Sochor B. Tetz, 401 Church Ave., Brooklyn, N. Y.; No. 133, Henry Clay Tindall, 217 E. Broadway, Excelsior Springs, Mo.; No. 134, Clay Louis Vallandingham, Owenton, Ky.; No. 135, John James Wickham, Jr., 2629 St. Paul St., Baltimore, Md.

(*Motion No. 31.*) *Vote on applications for active membership in the American Pharmaceutical Association.*

87. *Applicants for Membership on Account of Contributions to the Headquarters Building Fund.* The following non-members of the A. PH. A. have pledged $25.00 or more to the Headquarters Building Fund and have made a cash payment of $5.00 or more. They are entitled to membership and you are requested to vote on the applications which have been properly endorsed.

H-274, Clarice A. Abrams, 100 Eighth St., Calumet, Mich.; H-275, William Edward Allard, 147 Main St., Littleton, N. H.; H-276, Truman H. Armstrong, Jr., Bountiful, Utah; H-277, Clarence G. Bender, 3100 North Grand Blvd., St. Louis, Mo.; H-278, Solomon Lasker Bernstein, 680 Munroe St., Brooklyn, N. Y.; H-279, Alden J. Blacketer, 1462 So. Illinois St., Indianapolis, Ind.; H-280, Robert Wallace Boyd, 614 E. New York St., Portland, Ore.; H-281, Paul C. Braunschweiger, 102 Cayuga Ave., Warren, Penna.; H-282, Leo Bernard Brosky, 265 Fisk St., Pittsburgh, Pa.; H-283, Sister M. Irene Broussard, 1321 Annunciation St., New Orleans, La.; H-284, Ella Verle Brown, 527 E. Main St., Missoula, Mont.; H-285, Wallace R. Calkins, 1826 16th St., Eureka, Calif.; H-286, Rex Earl Clements, 19 North Irvin St., San Angelo, Texas; H-287, Louis Cohen, 241 Jackson Ave., Long Island City, N. Y.; H-288, Marion L. Cotton, Melbourne, Wash.; H-289, John Bartholomew Crosetti, 2014 Lombard St., San Francisco, Calif.; H-290, Louis Czap, 839 Central Ave., Detroit, Mich.; H-291, Doris D. Donan, 1202 Nebraska St., Mound City, Mo.; H-292, Clarence W. Dooley, 433 Market St., Williamsport, Penna.; H-293, Otto L. Dorman, 3706 Prospect Ave., Kansas City, Mo.; H-294, Robert Thomas Dunn, 503 Addie St., Lead, S. Dak.; H-295, Clark Ehlers, 2501 Jefferson Ave., Cincinnati, Ohio; H-296, Joseph Lawrence Fay, 3003 43rd St., S. E., Portland, Ore.; H-297, Eugene Forest, Ashley, N. Dak.; H-298, Marguerite M. Franey, 3714 Michigan Ave., Cincinnati, O.; H-299, Frederick Gerken, 133-08 Rockaway Blvd., South Ozone Park, L. I., N. Y.; H-300, Charles Louis Giampaoli, 2069 Filbert St., San Francisco, Calif.; H-301, Orville Hilborn Hamlin, 417 N. Armstrong St., Kokomo, Ind.; H-302, Albert M. Hammes, New England, No. Dak.; H-303, Reuben L. Hammond, 1018 Palm St., Little Rock, Ark.; H-304, William J. Hardgrave, 1422 14th Ave., San Francisco, Calif.; H-305, Wilton O. Harlan, 1301 Montgomery St., Oroville, Calif.; H-306, Andrew M. Heyl, 22 West Ninth St., Erie, Pa.; H-307, Morris William Hillinger, 964 Brooklyn Ave., Brooklyn, N. Y.; H-308, Edward Dolliver Holmes, Havana, N. D.; H-309, Palmer Cecil Jay, Pawnee, Okla.; H-310, Ralph Victor Kelling, Toronto, So. Dak.; H-311, Herman A. Katz, 261 Orange St., San Bernardino, Calif.; H-312, Elbert Sidney Kidd, 58 Bourne St., Auburndale, Mass.; H-313, Hilmer August Kraege, Yorktown, Texas; H-314, Wilbur H. Kretlow, Valley, Nebr.; H-315, Clayton L. Kropp, 415 W. 8th Ave., Columbus, Ohio; H-316, Burton Cliffe Kuntzner, 419 Ross St., Glendale, Calif.; H-317, Edward Lawrence Lady, 200 So. "B" St., Richmond, Ind.; H-318, Robert Lally, 1096 Waterman Ave., Detroit, Mich.; H-319, Robert Lang, 2322 Crotona Ave.,

Bronx, N. Y.; H-320, Lee H. Leger, 326 Main St., Westplains, Mo.; H-321, Luther Winson Liebrich, 2245 Flora St., Cincinnati, Ohio; H-322, M. Virginia Light, 1427 13th St., Des Moines, Iowa; H-323, Lloyd Livingston, 1009 Park Ave., Indianapolis, Ind.; H-324, David A. Lofgren, 625 W. 120th St., Chicago, Ill.; H-325, Jesse G. Luse, 7600 So. Broadway, St. Louis, Mo.; H-326, Samuel Malkin, 166 So. 4th Street, Brooklyn, N. Y.; H-327, Graham Mann, No. 7 Fifth St., Vallejo, Calif.; H-328, Theodore Melosh, 1138 P St., Lincoln, Nebr.; H-329, Charles Herbert McGlashan, 204 Shirley Ave., Buffalo, N. Y.; H-330, William Marston Mead, Chico, Texas; H-331, Milton Leon Meisner, 2071 Walton Ave., Bronx, N. Y.; H-332, Carl August Meyer, 420 Fairfield Ave., Bellevue, Ky.; H-333, John Brown Mill, 630 Classon Ave., Brooklyn, N. Y.; H-334, Robert A. Miller, 214 N. Jefferson St., Van Wert, Ohio; H-335, Myers Leon Mobley, Nevada City, Calif.; H-336, Felix A. Ortman, Flaxville, Mont.; H-337, Albert Wanner Perez, 1023 N. Galvez, New Orleans, La.; H-338, William M. Peters, 1824 Lyndale So., Minneapolis, Minn.; H-339, Spencer F. Pettis, R. F. D. No. 5, Box 41, Oxford, Miss.; H-340, Robert Reginald Pierce, 484 High St., Morgantown, W. Va.; H-341, Ancil Planto, 603 Montana St., San Antonio, Texas; H-342, Alexander Pollock, 208 N. Central Ave., Chicago, Ill.; H-343, Ernest Leonard Proskovec, 1713 South 12th St., Omaha, Nebr.; H-344, George William Putegnat, c/o Willman's Pharmacy, Brownsville, Texas; H-345, Adam P. Rudigaugh, 116 W. Lincoln Way, Lisbon, Ohio; H-346, Sydney Wright Russell, 56 Cottage St., Easthampton, Mass.; H-347, Reuben Savin, 338 MacDonald Ave., Richmond, Calif.; H-348, Adolph Oscar Scheh, Boise D'Arc St., Lockhart, Texas; H-349, William Settino, 916 Clay St., Sharpsburg, Pa.; H-350, Frank H. Schuh, R. F. D. "C," Box 303, Indianapolis, Indiana; H-351, James Sherry, 941 Amsterdam Ave., New York, N. Y.; H-352, George Silverman, 228 No. New Hampshire Ave., Los Angeles, Calif.; H-353, Irma Smith, 3020 Cockrell St., Fort Worth, Texas; H-354 Paul Jay Snyder, 3411 Cedardale Road, Baltimore, Md.; H-355, Sidney Lang Spieldock 320 N. Vandeventer St., St. Louis, Mo.; H-356, Aubrey Springer, 1414 Amsterdam Ave., New York, N. Y.; H-357, Peter Chester Srutwa, 5200 Roscoe St., Chicago, Ill.; H-358, Herbert John Verhulst, 85th & 32nd Sts., N. W., Seattle, Wash.; H-359, James Odell Wilbanks, High St., Lynchburg, Ohio; H-360, Gordon Lenroot Willis, Grantsville, Utah; H-361, Ewald Witt, Box 1121, Station A., Lincoln, Nebr.; H-362, Theodor G. Wolff, 2849 Belmont Ave., Chicago, Ill.; H-363, Wilbert Wah Wong, 917 Sixth St., Sacramento, Calif.; H-364, William Jay Yeber, 628 N. Sixth St., Rochelle, Ill.

(*Motion No. 32.*) *Vote on applications of contributors to the Headquarters Building Fund for Membership in the American Pharmaceutical Association.*

E. F. KELLY, *Secretary.*

DE KRUIF'S "MICROBE HUNTERS."

Accuracy should obtain in all books that are intended to inform the public relative to science. The most interesting book "Microbe Hunters" which has been widely read is said to contain a number of mis-statements and attention thereto has been directed by Drs. Aldo Castellani, George C. Low, David Nabarro and Ronald Ross. Over their signatures they say that the author's statements about themselves and their researches are incorrect; that these statements are not supported by reference to the original literature and that, in their opinion, the knowledge of the author on the subjects in which they are concerned is incomplete. They further refer to a statement by Dr. Cuthbert Christy in which several inaccuracies are pointed out. A notable one is relative to the following quotations: "The third member became disgusted with the ignorance and failure of his two colleagues and went off prospecting for rubber." . . . . This entry Dr. Christy says is untrue and adds that he has always given credit to Castellani for his discovery of the trypanosome as the etiological agent of sleeping sickness. He denies also his abandoning of his colleagues and going off prospecting for rubber, that he did not become interested in rubber until 1906 which was three years after the labors of the First Sleeping Sickness Commission were completed.

Which city is your choice for the A. Ph. A. Headquarters? Have you voted?

A HALF CENTURY OF THE NATIONAL FORMULARY, 1880–1930.

BY H. A. LANGENHAN.

(*Continued from p. 266, Mar.* JOUR. A. PH. A.)

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
VINUM ALBUM FORTIUS	..	..	..	..	..	..	..	291	L	L	..	..
Stronger White Wine	..	..	..	..	..	..	..	..	E	E	..	..
VINUM ALOES	292	292	..	292	292	292	292	292	L	L	..	..
Wine of Aloes	..	..	..	..	..	..	..	..	E	E	..	..
VINUM ANTIMONII	293	293	293	293	293	293	293	293	293	293	L	y
Wine of Antimony	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Antimon.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM AURANTII	..	..	..	..	..	..	..	L	L	L	..	..
Wine of Orange	..	..	..	..	..	..	..	E	E	E	..	..
VINUM AURANTII COMPOSITUM	..	..	..	..	..	..	..	L	L	L	L	..
Compound Wine of Orange	..	..	..	..	..	..	..	E	E	E	E	..
Elixir Aurantorium Compositum	..	..	..	..	..	..	..	S	S	S	S	..
Compound Elixir of Orange	..	..	..	..	..	..	..	S	S	S	S	..
Vin. Aurant. Co.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM CARNIS	..	..	..	..	..	..	..	L	L	L	L	..
Wine of Beef	..	..	..	..	..	..	..	E	E	E	E	..
Beef and Wine	..	..	..	..	..	..	..	S	S	S	S	..
Vin. Carn.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM CARNIS ET FERRI	..	..	..	..	..	..	..	L	L	L	L	z
Wine of Beef and Iron	..	..	..	..	..	..	..	E	E	E	E	..
Beef, Wine and Iron	..	..	..	..	..	..	..	S	S	S	S	..
Vin. Carn. et Ferr.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM CARNIS, FERRI ET CINCHONÆ	..	..	..	..	..	..	..	L	L	L	..	..
Wine of Beef, Iron and Cinchona	..	..	..	..	..	..	..	E	E	E	..	..
Beef, Wine, Iron and Cinchona	..	..	..	..	..	..	..	S	S	S	..	..
VINUM COCÆ AROMATICUM	..	..	..	..	..	..	..	..	..	L	..	..
Aromatic Wine of Coca	..	..	..	..	..	..	..	..	..	E	..	..
Aromatic Wine of Coca	..	..	..	..	..	..	..	S	S	..	..	..
VINUM ERYTHROXYLI AROMATICUM	..	..	..	..	..	..	..	L	L	..	..	..
Vinum Erythroxyli Aromaticum	..	..	..	..	..	..	..	..	..	S	..	..
Aromatic Wine of Erythroxylin	..	..	..	..	..	..	..	E	E	..	..	..
Aromatic Wine of Erythroxylin	..	..	..	..	..	..	..	..	..	S	..	..
VINUM COLCHICI CORMI	za	za	za	za	za	za	za	za	za	..	L	294
Wine of Colchicum Cormi	..	..	..	..	..	..	..	..	..	..	E	..
VINUM COLCHICI RADICIS	..	..	..	..	..	..	..	..	..	L	..	..
Wine of Colchicum Root	..	..	..	..	..	..	..	..	..	E	..	..
Vin. Colchic. Corm.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM COLCHICI SEMINIS	..	295	..	295	295	295	295	295	295	295	L	..
Wine of Colchicum Seed	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Colchic. Sem.	..	..	..	..	..	..	..	..	..	..	A	..

291—See **VINUM ALBUM FORTIUS**, U. S. P.
292—See **VINUM ALOES**, U. S. P.
293—See **VINUM ANTIMONII**, U. S. P.
y—See **TINCTURA ANTIMONII**, N. F.
z—See **ELIXIR CARNIS ET FERRI**, N. F.
za—See **TINCTURA COLCHICI CORMI FORTIOR**, N. F.
294—See **VINUM COLCHICI RADICIS**, U. S. P.
295—See **VINUM COLCHICI SEMINIS**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
VINUM ERYTHROXYLI	..	..	..	..	..	..	..	L	L	296	..	..
Wine of Erythroxylon	..	..	..	..	..	..	..	E	E	..	..	..
Wine of Coca	..	..	..	..	..	..	..	S	S	..	..	..
VINUM FERRI	297	..	297	..	..	..	..	297	297	297	L	..
Wine of Iron	..	..	..	..	..	..	..	..	..	..	E	..
Wine of Citrate of Iron	..	..	..	..	..	..	..	..	..	..	S	..
Vin. Ferr.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM FERRI AMARUM	..	..	..	..	..	..	..	298	298	298	L	..
Bitter Wine of Iron	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Ferr. Amar.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM FRAXINI	..	..	..	..	..	..	..	..	..	..	L	..
Wine of White Ash	..	..	..	..	..	..	..	E	E	E	E	..
VINUM FRAXINI AMERICANÆ	..	..	..	..	..	..	..	L	L	L	..	..
Vin. Frax.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM IPECACUANHÆ	299	299	299	299	299	299	299	299	299	299	L	..
Wine of Ipecac	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Ipecac.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM PEPSINI	..	..	..	..	..	..	..	L	L	L	L	..
Wine of Pepsin	..	..	..	..	..	..	..	E	E	E	E	..
Pepsin Wine	..	..	..	..	..	..	..	S	..	S	S	..
Vin. Pepsin.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM PICIS	..	..	..	..	..	..	..	L	L	L	L	..
Wine of Tar	..	..	..	..	..	..	..	E	E	E	E	..
Vin. Pic.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM PRUNI VIRGINIANÆ	..	..	..	..	..	..	..	L	L	L	L	..
Wine of Wild Cherry	..	..	..	..	..	..	..	E	E	E	E	..
Vin. Prun. Virg.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM PRUNI VIRGINIANÆ FERRATUM	..	..	..	..	..	..	..	L	L	L	L	..
Ferrated Wine of Wild Cherry	..	..	..	..	..	..	..	E	E	E	E	..
Vin. Prun. Virg. Ferr.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM RHEI COMPOSITUM	..	..	..	..	..	..	..	..	..	..	L	..
Compound Wine of Rhubarb	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Rhei. Co.	..	..	..	..	..	..	..	..	..	..	A	..
VINUM RHEI	300	300	..	300	300	300	300	300	L	L	..	..
Wine of Rhubarb	..	..	..	..	..	..	..	..	E	E	..	..
VINUM XERICUM	301	301	301	301	301	301	301	301	301	301	L	..
Sherry Wine	..	..	..	..	..	..	..	..	..	..	E	..
Vin. Xeric.	..	..	..	..	..	..	..	..	..	..	A	..

THE NATIONAL FORMULARY.
PART II.

ABSINTHIUM	..	..	1	1	1	1	1	1	1	..	L	..
Absinthium	..	..	..	..	..	..	..	..	..	..	E	..
Wormwood	..	..	..	..	..	..	..	..	..	..	S	..
Absinth.	..	..	..	..	..	..	..	..	..	..	A	..

296—See **VINUM COCÆ**, U. S. P.
297—See **VINUM FERRI**, U. S. P.
298—See **VINUM FERRI AMARUM**, U. S. P.
299—See **VINUM IPECACUANHÆ**, U. S. P.
300—See **VINUM RHEI**, U. S. P.
301—See **VINUM ALBUM**, U. S. P.
1—See **ABSINTHIUM**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
ACIDUM BROMAURICUM	..	..	..	..	..	..	..	..	..	..	L	L
Bromauric Acid	..	..	..	..	..	..	..	..	..	..	E	E
Acid. Bromaur.	..	..	..	..	..	..	..	..	..	..	A	A
ACIDUM FORMICUM	..	..	..	..	..	..	..	..	..	..	L	L
Formic Acid	..	..	..	..	..	..	..	..	..	..	E	E
Acid. Formic.	..	..	..	..	..	..	..	..	..	..	A	A
ACIDUM NITROHYDROCHLORICUM	..	..	..	2	2	2	2	2	2	2	2	L
Nitrohydrochloric Acid	..	..	..	..	..	..	..	..	..	..	..	E
Nitromuriatic Acid	..	..	..	..	..	..	..	..	..	..	..	S
Acid. Nitrohydrochlor.	..	..	..	..	..	..	..	..	..	..	..	A
ACIDUM NITROHYDROCHLORICUM DILUTUM	..	..	..	..	..	3	3	3	3	3	3	L
Diluted Nitrohydrochloric Acid	..	..	..	..	..	..	..	..	..	..	..	E
Diluted Nitromuriatic Acid	..	..	..	..	..	..	..	..	..	..	..	S
Acid Nitrohydrochlor. Dil.	..	..	..	..	..	..	..	..	..	..	..	A
ADONIS	..	..	..	..	..	..	..	..	..	..	L	L
Adonis	..	..	..	..	..	..	..	..	..	..	E	E
Pheasant's Eye	..	..	..	..	..	..	..	..	..	..	S	S
Adon.	..	..	..	..	..	..	..	..	..	..	A	A
ÆTHER ACETICUS	..	..	..	..	..	..	..	4	4	4	L	L
Acetic Ether	..	..	..	..	..	..	..	..	..	..	E	E
Ethyl Acetate	..	..	..	..	..	..	..	..	..	..	S	S
Aeth. Acet.	..	..	..	..	..	..	..	..	..	..	A	A
AGARICUS	..	..	..	..	..	..	..	..	..	..	L	L
Agaric	..	..	..	..	..	..	..	..	..	..	E	E
White Agaric	..	..	..	..	..	..	..	..	..	..	S	S
Larch Agaric	..	..	..	..	..	..	..	..	..	..	S	S
Agaric	..	..	..	..	..	..	..	..	..	..	A	A
ALETRIS	5	5	5	5	5	5	..	..	..	..	L	L
Aletris	..	..	..	..	..	..	..	..	..	..	E	E
Unicorn Root	..	..	..	..	..	..	..	..	..	..	S	S
Star Grass	..	..	..	..	..	..	..	..	..	..	S	S
Aletr.	..	..	..	..	..	..	..	..	..	..	A	A
ALLIUM	6	6	6	6	6	6	6	6	6	..	L	L
Garlic	..	..	..	..	..	..	..	..	..	..	E	E
ALTHÆA FOLIA	..	..	..	7	..	..	..	..	..	..	L	L
Althæa Leaves	..	..	..	..	..	..	..	..	..	..	E	E
Marsh Mallow Leaves	..	..	..	..	..	..	..	..	..	..	S	S
Althæ. Fol.	..	..	..	..	..	..	..	..	..	..	A	A
ALUMINI CHLORIDUM	..	..	..	..	..	..	..	..	..	..	L	L
Aluminum Chloride	..	..	..	..	..	..	..	..	..	..	E	E
Alum. Chlor.	..	..	..	..	..	..	..	..	..	..	A	A
ALUMINI SULPHAS	..	..	..	..	..	..	8	8	8	8	L	L
Aluminum Sulphate	..	..	..	..	..	..	..	..	..	..	E	E
Alum. Sulph.	..	..	..	..	..	..	..	..	..	..	A	A

2—See **ACID NITROHYDROCHLORICUM**, U. S. P.
3—See **ACID NITROHYDROCHLORICUM DILUTUM**, U. S. P.
4—See **ÆTHER ACETICUS**, U. S. P.
5—See **ALETRIS**, U. S. P.
6—See **ALLIUM**, U. S. P.
7—See **ALTHÆA FOLIA ET RADIX**, U. S. P.
8—See **ALUMINI SULPHAS**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
AMMONII HYPOPHOSPHIS	..	..	..	..	..	..	..	..	..	..	L	L
Ammonium Hypophosphite	..	..	..	..	..	..	..	..	..	..	E	E
Ammon. Hypophos.	..	..	..	..	..	..	..	..	..	..	A	A
AMMONII PHOSPHAS	..	..	..	..	..	..	..	9	..	..	L	L
Ammonium Phosphate	..	..	..	..	..	..	..	..	..	..	E	E
Ammon. Phos.	..	..	..	..	..	..	..	..	..	..	A	A
AMMONII VALERAS	..	..	..	..	..	10	10	10	10	10	10	L
Ammonium Valerati	..	..	..	..	..	..	..	..	..	..	..	E
Ammonium Valerianate	..	..	..	..	..	..	..	..	..	..	..	S
Ammon. Valer.	..	..	..	..	..	..	..	..	..	..	..	A
ANETHOL	..	..	..	..	..	..	..	..	..	..	L	L
Anethol	..	..	..	..	..	..	..	..	..	..	E	E
ANGELICÆ FRUCTUS	..	..	..	..	..	..	..	..	..	..	L	L
Angelica Fruit	..	..	..	..	..	..	..	..	..	..	E	E
Angelica Seed	..	..	..	..	..	..	..	..	..	..	S	S
Angel. Fruct.	..	..	..	..	..	..	..	..	..	..	A	A
ANGELICÆ RADIX	11	11	11	11	11	11	..	..	..	..	L	L
Angelica Root	..	..	..	..	..	..	..	..	..	..	E	E
Angel. Rad.	..	..	..	..	..	..	..	..	..	..	A	A
ANISUM	12	12	..	12	12	12	12	12	12	12	12	L
Anise	..	..	..	..	..	..	..	..	..	..	..	E
Anise Seed	..	..	..	..	..	..	..	..	..	..	..	S
Anis.	..	..	..	..	..	..	..	..	..	..	..	A
ANTIMONII OXIDUM	13	..	..	..	..	13	13	13	13	..	L	L
Antimony Oxide	..	..	..	..	..	..	..	..	..	..	E	E
Antim. Oxid.	..	..	..	..	..	..	..	..	..	..	A	A
ANTIMONII SULPHIDUM PURIFICATUM	..	..	..	..	..	..	..	14	14	L	..	..
Purified Antimony Sulphide	..	..	..	..	..	..	..	..	..	E	..	..
Purified Antimony Trisulphide	..	..	..	..	..	..	..	..	..	S	..	..
ANTIMONIUM SULPHURATUM	..	..	..	..	..	15	15	15	15	L	L	..
Sulphurated Antimony	..	..	..	..	..	..	..	..	..	E	E	..
Kermes Mineral	..	..	..	..	..	..	..	..	..	S	S	..
Antimonium Oxysulphuratum	..	..	..	..	..	..	..	..	..	..	S	..
Antim. Sulphurat.	..	..	..	..	..	..	..	..	..	A	A	..
APII FRUCTUS	..	..	..	..	..	..	..	..	..	..	L	L
Celery Fruit	..	..	..	..	..	..	..	..	..	..	E	E
Celery Seed	..	..	..	..	..	..	..	..	..	..	S	S
Apii. Fruct.	..	..	..	..	..	..	..	..	..	..	A	A
APOCYNUM	16	16	..	16	16	16	16	16	16	16	..	L
Apocynum	..	..	..	..	..	..	..	..	..	..	E	E
Canadian Hemp	..	..	..	..	..	..	..	..	..	..	S	S
Apocyn.	..	..	..	..	..	..	..	..	..	..	A	A
ARALIA	..	..	..	..	..	..	..	..	..	..	L	L
Aralia	..	..	..	..	..	..	..	..	..	..	E	E

9—See **AMMONII PHOSPHAS**, U. S. P.
10—See **AMMONII VALERAS**, U. S. P.
11—See **ANGELICA**, U. S. P.
12—See **ANISUM**, U. S. P.
13—See **ANTIMONII OXIDUM**, U. S. P.
14—See **ANTIMONII SULPHIDUM PURIFICATUM**, U. S. P.
15—See **ANTIMONII SULPHURATUM**, U. S. P.
16—See **APOCYNUM**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
American Spiknard	..	..	..	..	..	..	..	..	..	..	S	S
Spignet	..	..	..	..	..	..	..	..	..	..	S	S
ARNICA	17	17	17	17	17	17	17	17	17	17	17	L
Arnica	..	..	..	..	..	..	..	..	..	..	..	E
Arnica Flowers	..	..	..	..	..	..	..	..	..	..	..	S
Arnic	..	..	..	..	..	..	..	..	..	..	..	A
ASARUM	18	18	18	18	18	18	18	..	..	..	L	L
Asarum	..	..	..	..	..	..	..	..	..	..	E	E
Canada Snake-root	..	..	..	..	..	..	..	..	..	..	S	S
Wild Ginger	..	..	..	..	..	..	..	..	..	..	S	S
Asar	..	..	..	..	..	..	..	..	..	..	A	A
ASCLEPIAS	19	19	19	19	19	19	19	91	19	..	L	L
Asclepias	..	..	..	..	..	..	..	..	..	..	E	E
Pleurisy Root	..	..	..	..	..	..	..	..	..	..	S	S
Asclep	..	..	..	..	..	..	..	..	..	..	A	A
AVENA SATIVA	..	..	..	..	..	..	..	..	..	..	..	L
Oat	..	..	..	..	..	..	..	..	..	..	..	E
BAPTISIA	..	..	..	..	..	..	..	..	..	..	L	L
Baptisia	..	..	..	..	..	..	..	..	..	..	E	E
Wild Indigo	..	..	..	..	..	..	..	..	..	..	S	S
Babtis	..	..	..	..	..	..	..	..	..	..	A	A
BERBERIS	..	..	20	..	20	20	..	..	..	20	L	L
Berberis	..	..	..	..	..	..	..	..	..	..	E	E
Oregon Grape Root	..	..	..	..	..	..	..	..	..	..	S	S
Berber	..	..	..	..	..	..	..	..	..	..	A	A
BITUMEN SULPHONATUM	..	..	..	..	..	..	..	..	..	..	..	L
Sulphonated Bitumen	..	..	..	..	..	..	..	..	..	..	..	E
BOLDUS	..	..	..	..	..	..	..	..	..	..	L	L
Boldus	..	..	..	..	..	..	..	..	..	..	..	E
Boldo	..	..	..	..	..	..	..	..	..	..	S	..
Boldo Leaves	..	..	..	..	..	..	..	..	..	..	S	S
BRAYERA	..	..	..	..	..	21	21	21	..	..	L	L
Brayera	..	..	..	..	..	..	..	..	..	..	E	E
Kousso	..	..	..	..	..	..	..	..	..	..	S	S
Cusso	..	..	..	..	..	..	..	..	..	..	S	S
Brayer	..	..	..	..	..	..	..	..	..	..	A	A
BROMUM	..	..	..	22	22	22	22	22	22	22	L	L
Bromine	..	..	..	..	..	..	..	..	..	..	E	E
BRYONIA	..	..	..	..	..	..	..	23	23	..	L	L
Bryonia	..	..	..	..	..	..	..	..	..	..	E	E
Bryony	..	..	..	..	..	..	..	..	..	..	S	S
Bryon	..	..	..	..	..	..	..	..	..	..	..	A
CACAO PRÆPARATA	..	..	..	..	..	..	..	..	..	..	L	L
Cocoa	..	..	..	..	..	..	..	..	..	..	E	E
Prepared Cacao	..	..	..	..	..	..	..	..	..	..	S	S

17—See **ARNICA**, U. S. P.
18—See **ASARUM**, U. S. P.
19—See **ASCLEPIAS**, U. S. P.
20—See **BERBERIS**, U. S. P.
21—See **BRAYERA**, U. S. P.
22—See **BROMUM**, U. S. P.
23—See **BRYONIA**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
CACTUS GRANDIFLORUS	..	..	..	..	..	..	..	..	..	..	L	L
Cactus Grandiflorus	..	..	..	..	..	..	..	..	..	..	E	E
Night Blooming Cereus	..	..	..	..	..	..	..	..	..	..	..	S
Cact. Grand.	..	..	..	..	..	..	..	..	..	..	A	A
CALAMINA PRÆPARATA	24	24	24	24	24	..	..	..	..	..	L	L
Prepared Calamine	..	..	..	..	..	..	..	..	..	..	E	E
Lapis Calaminaris	..	..	..	..	..	..	..	..	..	..	S	S
Calamin. Præp.	..	..	..	..	..	..	..	..	..	..	A	A
CALCIUM HYPOPHOSPHIS	..	..	..	..	..	..	25	25	25	25	25	L
Calcium Hypophosphite	..	..	..	..	..	..	..	..	..	..	..	E
Calc. Hypophos.	..	..	..	..	..	..	..	..	..	..	..	A
CALCII LACTOPHOSPHAS	..	..	..	..	..	..	..	..	..	..	L	L
Calcium Lactophosphate	..	..	..	..	..	..	..	..	..	..	E	E
Calc. Lactophos.	..	..	..	..	..	..	..	..	..	..	A	A
CALCII PHOSPHAS PRÆCIPITATUS	..	..	..	..	..	26	26	26	26	26	L	L
Precipitated Calcium Phosphate	..	..	..	..	..	..	..	..	..	..	E	E
Calc. Phos. Præc.	..	..	..	..	..	..	..	..	..	..	A	A
CALENDULA	..	..	..	..	..	..	..	27	27	27	L	L
Calendula	..	..	..	..	..	..	..	..	..	..	E	E
Marigold	..	..	..	..	..	..	..	..	..	..	S	S
CANELLA	28	28	28	28	28	28	28	..	..	..	L	L
Canella	..	..	..	..	..	..	..	..	..	..	E	E
Canell.	..	..	..	..	..	..	..	..	..	..	A	..
CARAMEL	..	..	..	..	..	..	..	..	..	..	L	L
Caramel	..	..	..	..	..	..	..	..	..	..	E	E
Saccharum Ustum	..	..	..	..	..	..	..	..	..	..	S	S
Burnt Sugar Coloring	..	..	..	..	..	..	..	..	..	..	S	S
Caram.	..	..	..	..	..	..	..	..	..	..	A	A
CARBO ANIMALIS PURIFICATUS	..	..	..	29	29	29	29	29	29	29	..	L
Purified Animal Charcoal	..	..	..	..	..	..	..	..	..	..	..	E
CARMINUM	..	..	..	..	..	..	..	..	..	..	L	L
Carmine	..	..	..	..	..	..	..	..	..	..	E	E
Carmin.	..	..	..	..	..	..	..	..	..	..	A	A
CASCARILLA	30	30	30	30	30	30	30	30	30	..	L	L
Cascarilla	..	..	..	..	..	..	..	..	..	..	E	E
Sweetwood Bark	..	..	..	..	..	..	..	..	..	..	S	..
Sweet Bark	..	..	..	..	..	..	..	..	..	..	S	..
Cascarill.	..	..	..	..	..	..	..	..	..	..	A	..
CASSIA FISTULA	31	31	31	31	31	31	31	31	31	31	L	L
Cassia Fistula	..	..	..	..	..	..	..	..	..	..	E	E
Purging Cassia	..	..	..	..	..	..	..	..	..	..	S	S
Cass. Fist.	..	..	..	..	..	..	..	..	..	..	A	A
CASTANEA	32	32	32	32	32	..	32	32	32	..	L	L
Castanea	..	..	..	..	..	..	..	..	..	..	E	E

24—See **CALAMINA PRAEPARATA,** U. S. P.
25—See **CALCIUM HYPOPHOSPHITE,** U. S. P.
26—See **CALCII PHOSPHAS PRÆCIPITATUS,** U. S. P.
27—See **CALENDULA,** U.S. P.
28—See **CANELLA,** U. S. P.
29—See **CARBO ANIMALIS PURIFICATUS,** U. S. P.
30—See **CASCARILLA,** U. S. P.
31—See **CASSIA FISTULA,** U. S. P.
32—See **CASTANEA,** U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
Chestnut Leaves	..	..	..	..	..	..	..	..	..	..	..	S
Castan.	..	..	..	..	..	..	..	..	..	..	A	..
CATARIA	..	..	..	33	33	33	33	..	..	..	L	L
Catnep	..	..	..	..	..	..	..	..	..	..	E	E
Catmint	..	..	..	..	..	..	..	..	..	..	S	S
Catar.	..	..	..	..	..	..	..	..	..	..	A	..
CAULOPHYLLUM	..	..	..	..	..	..	..	34	34	..	L	L
Caulophyllum	..	..	..	..	..	..	..	..	..	..	E	E
Blue Cohosh	..	..	..	..	..	..	..	..	..	..	S	S
Papoose Root	..	..	..	..	..	..	..	..	..	..	S	S
Squaw Root	..	..	..	..	..	..	..	..	..	..	S	S
Cauloph.	..	..	..	..	..	..	..	..	..	..	A	A
CENTAURIUM	..	..	..	..	..	..	..	..	..	..	L	L
Centaury	..	..	..	..	..	..	..	..	..	..	E	E
Centaur.	..	..	..	..	..	..	..	..	..	..	A	..
CEREVISIÆ FERMENTUM COMPRESSUM	..	..	..	..	..	..	..	..	..	..	L	L
Compressed Yeast	..	..	..	..	..	..	..	..	..	..	E	E
Cerev. Ferm. Compr.	..	..	..	..	..	..	..	..	..	..	A	A
CHIMAPHILA	..	35	..	35	35	35	35	35	35	35	L	L
Chimaphila	..	..	..	..	..	..	..	..	..	..	E	E
Pipsissewa	..	..	..	..	..	..	..	..	..	..	S	S
Chimaph.	..	..	..	..	..	..	..	..	..	..	A	A
CHIONANTHUS	..	..	..	..	..	..	..	..	..	..	L	L
Chionanthus	..	..	..	..	..	..	..	..	..	..	E	E
Fringe Tree Bark	..	..	..	..	..	..	..	..	..	..	S	S
Chionanth.	..	..	..	..	..	..	..	..	..	..	A	A
CHIRATA	..	..	..	..	..	36	36	36	36	36	L	L
Chirata	..	..	..	..	..	..	..	..	..	..	E	E
Chirat.	..	..	..	..	..	..	..	..	..	..	A	A
COCCULUS	..	..	..	..	..	..	..	..	..	..	..	L
COCCULUS INDICUS	..	..	..	..	..	..	..	..	..	..	L	..
Cocculus Indicus	..	..	..	..	..	..	..	..	..	..	E	E
Cocculus Indicus	..	..	..	..	..	..	..	..	..	..	..	S
Fish Berry	..	..	..	..	..	..	..	..	..	..	S	S
Indian Berry	..	..	..	..	..	..	..	..	..	..	..	S
Coccul. Ind.	..	..	..	..	..	..	..	..	..	..	A	..
COCILLANA	..	..	..	..	..	..	..	..	..	..	L	L
Cocillana	..	..	..	..	..	..	..	..	..	..	E	E
Guapi Bark	..	..	..	..	..	..	..	..	..	..	..	S
Cocillan.	..	..	..	..	..	..	..	..	..	..	A	A
COFFEA TOSTA	..	..	..	..	..	..	..	..	..	..	L	L
Coffee	..	..	..	..	..	..	..	..	..	..	E	E
Roasted Coffee	..	..	..	..	..	..	..	..	..	..	S	S
Coff. Tost.	..	..	..	..	..	..	..	..	..	..	A	A
CONDURANGO	..	..	..	..	..	..	..	..	..	..	L	L
Condurango	..	..	..	..	..	..	..	..	..	..	E	E
Conduran.	..	..	..	..	..	..	..	..	..	..	A	..

33—See **CATARIA,** U. S. P.
34—See **CAULOPHYLLUM,** U. S. P.
35—See **CHIMAPHILA,** U. S. P.
36—See **CHIRATA,** U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
CONIUM	..	..	37	37	37	..	37	37	37	37	L	L
Conium	..	..	..	..	..	..	..	..	..	..	E	E
Poison Hemlock	..	..	..	..	..	..	..	..	..	..	S	S
CONVALLARIAE FLORES	..	..	..	..	..	..	..	..	..	..	L	..
Convallaria Flowers	..	..	..	..	..	..	..	..	..	..	E	..
Lilly-of-the-Valley Flowers	..	..	..	..	..	..	..	..	..	..	S	..
Convallar. Flor.	..	..	..	..	..	..	..	..	..	..	A	..
CONVALLARIÆ RADIX	..	..	..	..	..	..	..	..	38	38	L	L
Convallaria Root	..	..	..	..	..	..	..	..	..	..	E	E
Lilly-of-the-Valley Root	..	..	..	..	..	..	..	..	..	..	S	S
Convallar. Rad.	..	..	..	..	..	..	..	..	..	..	A	..
COPTIS	39	39	39	39	39	39	39	..	..	..	L	L
Coptis	..	..	..	..	..	..	..	..	..	..	E	E
Goldthread	..	..	..	..	..	..	..	..	..	..	S	S
CORIANDRUM	40	40	40	40	40	40	40	40	40	40	40	L
Coriander	..	..	..	..	..	..	..	..	..	..	..	E
Coriander Seed	..	..	..	..	..	..	..	..	..	..	..	S
Coriand.	..	..	..	..	..	..	..	..	..	..	..	A
CORNUS	41	41	41	41	41	41	41	41	..	..	L	L
Cornus	..	..	..	..	..	..	..	..	..	..	E	E
Dogwood Bark	..	..	..	..	..	..	..	..	..	..	S	S
Corn.	..	..	..	..	..	..	..	..	..	..	A	..
CORYDALIS	..	..	..	..	..	..	..	..	..	..	L	L
Corydalis	..	..	..	..	..	..	..	..	..	..	E	E
Turkey Corn	..	..	..	..	..	..	..	..	..	..	S	S
Squirrel Corn	..	..	..	..	..	..	..	..	..	..	S	S
Coryd.	..	..	..	..	..	..	..	..	..	..	A	..
Corydal.	..	..	..	..	..	..	..	..	..	..	..	A
COUMARINUM	..	..	..	..	..	..	..	..	..	..	L	L
Coumarin	..	..	..	..	..	..	..	..	..	..	E	E
Coumar.	..	..	..	..	..	..	..	..	..	..	A	A
CROCUS	42	42	42	42	42	42	42	42	42	..	L	L
Crocus	..	..	..	..	..	..	..	..	..	..	E	..
Saffron	..	..	..	..	..	..	..	..	..	..	..	E
Saffron	..	..	..	..	..	..	..	..	..	..	S	..
Croc.	..	..	..	..	..	..	..	..	..	..	A	..
CYPRIPEIDIUM	..	..	..	..	..	43	43	43	43	43	L	L
Cypripedium	..	..	..	..	..	..	..	..	..	..	E	E
Lady Slipper Root	..	..	..	..	..	..	..	..	..	..	S	S
Cypriped.	..	..	..	..	..	..	..	..	..	..	A	A
DAMIANA	..	..	..	..	..	..	..	..	..	..	L	L
Damiana	..	..	..	..	..	..	..	..	..	..	E	E
Turnera	..	..	..	..	..	..	..	..	..	..	S	S
DELPHINIUM	44	44	..	44	44	44	44	..	..	..	L	L
Larkspur Seed	..	..	..	..	..	..	..	..	..	..	E	E
Delphin	..	..	..	..	..	..	..	..	..	..	S	S

37—See **CONIUM**, U. S. P.
38—See **CONVALLARIA**, U. S. P.
39—See **COPTIS**, U. S. P.
40—See **CORIANDRUM**, U. S. P.
41—See **CORNUS**, U. S. P.
42—See **CROCUS**, U. S. P.
43—See **CYPRIPEDIUM**, U. S. P.
44—See **DELPHINIUM**, U. S. P.

(To be continued)

EDITORIAL NOTES

Editor: E. G. EBERLE, 10 West Chase St., Baltimore, Md.

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CONGRESS OF MILITARY MEDICINE AND PHARMACY.

The fourth International Congress of Military Medicine and pharmacy will meet in Warsaw from April 30th to May 20th. Over forty countries are participating and more than 3000 members are expected to attend the meetings. At the end of May the President of the Polish Republic will open an international exhibition of hygiene, designed to demonstrate the technical as well as scientific advances realized in the field of health protection. This exhibition will consist of the following sections; (1) army field medical services; (2) science in the hospitals; (3) health organizations; (4) chemical and pharmaceutical; (5) surgical and dental instruments; (6) hospitals; (7) veterinary section. The pharmaceutical section will be presided over by Professor Koskowski, and will include exhibits of medicaments, pharmaceutical preparations, disinfectants, surgical dressings, dyes and preparations for physiological and bacteriological work, natural and artificial mineral waters, medicinal wines, medicated soaps, pharmaceutical utensils and apparatus, and fittings for pharmacies. The address of the exhibition committee is: Gmach U. S. Wojsk, 5 Nowowiejstza, Warsaw.

WORLD TRADE NOTES ON DRUGS, ALLIED PRODUCTS AND LAWS.

The following notes are abstracted from recent weekly reports of the Department of Commerce:

The root of *Derris elliptica* is being more extensively used in Great Britain as an insecticide. Formerly derris was used as an arrow poison in Malay and Borneo and also as a fish poison. For many years it has been extensively used by Chinese farmers as an insecticide and the larger use in Great Britain dates back to the recent war. A number of successful results have been reported. It is primarily a contact insecticide, although it is claimed also to be an effective stomach poison. In England it is principally used for spraying fruit trees and to some extent it is used in connection with domestic animals, and is said to be a companion of a number of proprietary insecticides.

The Belgian Kongo budget for 1927 includes appropriations for experimental work in the cultivation of cinchona. The cultivation is to be carried on in the higher lands of Eastern Kongo.

The pharmaceutical products law of Nicaragua imposes registration and other effects on foreign medical products other than patent medicines which is said to render the introduction of these products into Nicaragua unprofitable to foreign firms.

The American Minister, Charles C. Eberhardt, has been promised that the situation would be investigated with a view of modifying the law.

The exports of Candelilla Wax from the Chihuahua District of Mexico during 1926 amounted to about 120,000 pounds, valued at $22,862.00.

A 6% *ad valorem* surtax is collected on pharmaceutical specialties imported into Peru which is collected on the invoice value. The surtax is collected by means of stamps which must be affixed to the packages.

The time expires this month for the Peruvian druggists to formulate a catalog of prices of

their stock of pharmaceutical specialties for use by the Tariff Advisory Board, in conjunction with the commercial invoices as a basis for the *ad valorem* rates affecting the specialties. This catalog is to be corrected annually.

Saffron culture is one of Spain's largest industries. At the present time there are about 30,000 acres in Spain devoted to Saffron culture. In value this crop is surpassed only by sugar beet, paprika and sugar cane. The average annual value of the Saffron crop is about $500,000.

Several grades of Spanish saffron are known on the market. The following features enter into the grading—the length of the stigma, color, aroma and degree of purity.

The British group of islands in the Indian Ocean—Seychelles Islands—produce considerable quantities of several essential oils as, cinnamon leaf, clove, patchouli, lemon grass, etc. The 41 distilleries of the islands employ about 2000 people.

Large quantities of the oil of *Eucalyptus phellandra*—the narrow leaf peppermint tree—are distilled in Eastern Australia. It consists of phellandrene, cineol pinene, terpineol, geraniol, esters, sesquiterpene and a smaller amount of tiperitone. The oil is used chiefly as a flotation agent in mining, but also in the manufacture of disinfectants, insecticides, shoe polishes, soaps, perfumery, etc.

PERSONAL AND NEWS ITEMS.

M. L. G. Toraude, Vice-President of the Society of History of Pharmacy, was an apprentice during his earlier years in Caventou's pharmacy. Several years ago he was awarded the Henri Parville prize for his researches into general history and particularly for his work on Bernard Courtois, the discoverer of iodine, in which he established the claim of this pharmacist to the discovery.

Dr. Irving F. Smith, Sr., pathologist of the laboratory of the Bureau of Plant Industry, was the guest of honor at the annual dinner of the American Phyto-Pathological Society, held in Philadelphia.

Ex-President and Mrs. Henry Hurd Rusby have announced the marriage of their daughter Marguerite and Kenneth Davidson Muir, March 7th, in Boston.

Carson P. Frailey, Secretary of the American Drug Manufacturers' Association, was seriously injured in an automobile accident, but we are glad to learn that he is back at his desk.

E. H. Gane, for many years associated with McKesson & Robbins, is one of the organizers and directors of Parfums, Luyna, Inc., New York.

Harry J. Schnell, President of the New York Drug and Chemical Club, was given a dinner by members of the Club on March 31st, in recognition of his work as Chairman of the House Committee in connection with a transfer of the Club to its new headquarters. As a further expression of their appreciation, the members presented Mr. Schnell with a Tiffany grandfather's clock and a bronze figure of an Indian scout. A number of addresses were made commending the work and friendship of Mr. Schnell and the inscription on the clock reads "from his friends in the Drug and Chemical Club with affectionate regard and grateful appreciation of his unselfish services as Chairman of the House Committee."

Vice-President George Judisch, of the A. PH. A., has recently been lecturing to the nurses in the hospital at Ft. Dodge, Iowa, W. W. Haire, a member of the Iowa Pharmacy Board has been teaching pharmacy at the same hospital.

Dean Adolph Ziefle, of the School of Pharmacy of Oregon Agriculture College, is recovering from serious illness with pneumonia.

Dr. Paul S. Pittenger, of the Harvey-Pittenger Company, pharmaceutical specialties, Philadelphia, has entered the employ of Sharp & Dohme, Baltimore, in the pharmacological department. He will retain his interest in the Philadelphia concern.

Sir William S. Glyn-Jones, accompanied by his daughter, Dr. Kate Glyn-Jones, sailed for England on March 4th.

Dean Campbell, of the Department of Pharmacy, University of Saskatchewan, spent the winter in the Southern States, making Richmond, Va., his headquarters. He was accompanied by Mrs. Campbell and their daughter, Mrs. E. M. Counsell, of Winnipeg.

Prof. A. B. J. Moore, Head of the Pharmacy Department of McGill University, recently addressed the Pharmaceutical Society of the University on "Narcotics, Their Origin, Use and Abuse."

G. G. Colin, chemist of the Central Chemical Laboratory, Mexico, writes that knowledge of conditions—social and industrial—in the two countries will help to bring about a better

understanding and better commercial and diplomatic relations. The AMERICAN PHARMACEUTICAL ASSOCIATION welcomes membership from our neighbors and will be pleased to serve them whenever possible. Mr. Colin has contributed several papers to the JOURNAL.

Mr. and Mrs. R. L. Quigley entertained the members of the District of Columbia Board of Pharmacy in celebration of the passing and signing by the President, of the District of Columbia Pharmacy Law.

Secretary Kerfoot, A. C. Taylor and **R. L. Quigley** attended the Conference of Board Members and of the Colleges of District No. 2, in Philadelphia, and report the meeting as a great success.

J. Michlen, one of our Palestine (Jerusalem) members, writes that he desires to receive the YEAR BOOK, "because it is an interesting and important book for pharmacists, scientists and research workers."

Prof. Otto Raubenheimer, addressed the German Apothecaries' Society (New York), April 7th, on "Apothecary Henschke and Old Fritz." It is a contribution to the history of pharmacists in literature.

A sketch of **Clyde L. Eddy,** Managing Editor of the *Druggists' Circular*, is printed in the *Franklin News* for March 1927.

F. R. Peterson, former President of the N. A. R. D., recently addressed the students of North Pacific College of Pharmacy on the "Value of Organization." Besides advising the students to coöperate as business associates with members of the craft he advised them to take an interest in civic organizations.

Leonard A. Seltzer, Vice-Chairman of the A. PH. A. Headquarters, is now a member of the faculty of the School of Pharmacy of the City of Detroit and has charge of all prescription practice.

Dr. Henry J. Goeckel, Cranford, N. J., addressed Gamma-Gamma Chapter of Theta Kappa Psi Medical Fraternity of Columbia University on the subject of "Uses and Abuses and Short Comings of Clinical Laboratory Services." Reprints have been made of the address.

George G. Rosengarten, President of the American Chemical Society, has appointed the following to constitute a committee of direction for the National Institute of Chemistry recently founded by the Society: Gerald L. Wendt, dean of the School of Chemistry and Physics, Pennsylvania State College; Prof. Frank C. Whitmore, head of the Department of Chemistry, Northwestern University; Willis R. Whitney, director of the research laboratory of the General Electric Company, Schenectady; C. M. A. Stine, chemical director, E. I. du Pont de Nemours & Co., Wilmington; C. E. K. Mees, director of research and development, Eastman Kodak Company, Rochester; Fredric W. Willard, Western Electric Company, Chicago.

A half tone of former President, **James H. Beal** of the A. PH. A., graces the frontispiece of the April *Carolina Journal of Pharmacy.* He is to be a guest of the Association and one of the speakers of the meeting. Dr. Beal will also attend the West Virginia State Association meeting.

At their annual meeting, March 9th, the stockholders of the E. L. Patch Company, Boston, elected the following officers and directors: *President and Treasurer,* Ralph R. Patch; *Vice-President,* James A. Patch; *Secretary,* G. Y. Hutchins; *Assistant Treasurer,* W. S. Lister; other directors: H. W. Byron, Charles Wesley Dunn and E. W. Emery. Plans for the erection of a four-story concrete addition to the plant were started by the board.

Kiefer-Stewart company, wholesale druggists and manufacturers of perfume and toilet preparations, Indianapolis, Ind., recently purchased a large part of the capital stock of Walding, Kinnan & Marvin Company, wholesale druggists, of Toledo, Ohio. The stock purchased represented the holdings of the Dodge interests and a part of the Bradley interests in the Toledo concern.

Vice-President Joseph Jacobs, of the AMERICAN PHARMACEUTICAL ASSOCIATION has presented the Section on Historical Pharmacy with "The Loves of an Apothecary," and "Bibliotheca Technologica or, A Philological Library of Literary Arts and Sciences" by Benjamin Martin (1776). The latter book has twenty-five chapters which deal with religions, language, history, government, Pharmacy and Medicine; the former is dealt with in 25 pages and the latter, including surgery in 30 pages.

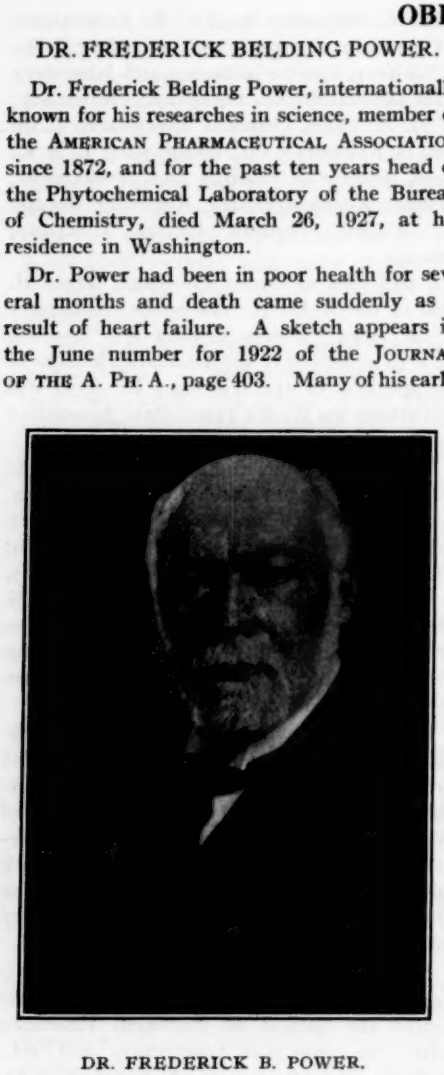
Pharmacy is divided into "Chymical and Galenical Pharmacy."—"The business of making medicines of the Galenic kind is called Pharmacopœia, and he who actually performs it is called Pharmacopoeius, or, vulgarly, an apothecary: but he is also called Pharmacopola, from his selling or vending medicines."

OBITUARY.

DR. FREDERICK BELDING POWER.

Dr. Frederick Belding Power, internationally known for his researches in science, member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1872, and for the past ten years head of the Phytochemical Laboratory of the Bureau of Chemistry, died March 26, 1927, at his residence in Washington.

Dr. Power had been in poor health for several months and death came suddenly as a result of heart failure. A sketch appears in the June number for 1922 of the JOURNAL OF THE A. PH. A., page 403. Many of his early



DR. FREDERICK B. POWER.

contributions to pharmaceutical literature appeared in the PROCEEDINGS, A. PH. A. His work on Chaulmoogra oil and its constituents is well known; his later work was carried on as indicated, in the laboratories of the Bureau of Chemistry, at Washington, one of the recent investigations being the odorous principle of the cotton which attracts the boll weevil. In more recent years Dr. Power favored the JOURNAL with a number of book reviews.

The deceased was born March 4, 1853, at Hudson, N. Y., the son of Thomas and Caroline Power. He was educated at the Hudson Academy and after serving an apprenticeship in the pharmacy of Thomas Whitfield, in Chicago, he matriculated at the Philadelphia College of Pharmacy, from which institution he was graduated, with high honors, in 1874. In 1876 he entered the University at Strassburg and pursued his studies there for four years, receiving the degree of Doctor of Philosophy. It was during his university years in Germany that a friendship was formed with Professor Flueckiger which continued throughout the life of the former. In 1880 Dr. Power returned to the Philadelphia College of Pharmacy where he had charge of the chemical laboratory until his election to a professorship in the University of Wisconsin. He organized and directed the course in Pharmacy until 1892, when he accepted the position as Scientific Director of the laboratories of the Schimmel & Company branch near New York, where he carried on important investigations pertaining to essential oils. In 1896, at the request of his classmate, Henry S. Wellcome, he went to London to establish the Chemical Research Laboratories of which he was director until the end of 1914, when he returned to the United States to assume duties in the Bureau of Chemistry, as head of the Phytochemical Laboratory.

Among other honors and medals the degree of L.L.D. was conferred upon him by the University of Wisconsin; in 1913, he was awarded the Hanbury gold medal in recognition of his researches in the natural history and chemistry of drugs. He was awarded the Ebert prize in 1877, 1892 and 1906; the latter for the paper on Eriodictyon, in coöperation with Frank Tutin. In 1922, he was awarded the Flueckiger medal. In 1924, he was elected member of the National Academy of Science. In 1921 at Washington, a medal was presented to him by Henry S. Wellcome, and on this occasion Dr. Charles D. Wolcott, of the Smithsonian Institution, in presenting the medal said, "Dr. Power for fifty years has spent his thinking hours among the complicated molecules of organic compounds and because he possesses that peculiar faculty of exhausting each subject which he takes up has had the greatest influence both in America and Great Britain in raising the standards of the pharmacopœias. He has gained distinction by his most difficult and life-consuming researches in the chemical composition of plant compounds." He was a member of the National Research Council on the Committee on Federal Relations.

Dr. Power was the author of a translation of the "Cinchona Barks" by Flueckiger, in 1883; translation of the "Principles of Pharmacognosy by Flueckiger and Tschirch," in 1887; and of a Manual of Chemical Analysis in 1883. He had served on several Revisions of the U. S. P. and as Vice-President of the present U. S. P. Convention. Few, if any members of the AMERICAN PHARMACEUTICAL ASSOCIATION have contributed more to science than Dr. Power; throughout his useful life, by his investigations, he added largely to the knowledge of materia medica; he was an honor to pharmacy and an inspiration to scientists and is entitled to a place in Pharmacy's Hall of Fame.

Two children survive the deceased, Mrs. William Heinke and Donald Meigs Power.

ALPHONSE MAJOR.

Alphonse Major, member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1913, and founder and President of the Major Manufacturing Co., died March 9th at his home in Huntington, L. I., age 78 years. Mr. Major was born March 23, 1849, in Canada, and came to Detroit in 1868. In 1876 he moved to New York, where he developed a large business.

A widow and daughter survive the deceased.

JACOB WEINKAUFF.

Jacob Weinkauff was born in Glanmunchweiler, Rhein-pfalz, Bavaria, Germany, Feb. 23, 1871. Here he attended public schools until he was ten years old, when his parents moved to the United States, living for one year in New Haven, Conn. From New Haven the family moved to Peoria, Ill., where Mr. Weinkauff attended the public schools for one year. Due to much sickness and the death of several members of the family, he was forced to leave school and help support the family. His first employment was that of office boy for a doctor of this town. During his spare time he studied medicine and chemistry from the books which his employer kindly loaned him.

His next position was that of errand boy for a local drug store. Realizing his financial inability to pursue the study of medicine he concentrated his efforts on the study of pharmacy and chemistry, working all day and studying at night. Having secured the financial aid of a very good friend, he entered Northwestern University in 1890, and graduated in Pharmacy with high honors in 1892. He then returned to Peoria and secured a position with Sutliff & Case Co., which was the outgrowth of the firm by whom he was formerly employed. Upon his return to this position, he began to develop the manufacturing of pharmaceuticals and its development is largely, if not solely, due to his untiring efforts. In 1912, he was admitted into the firm and remained a partner until his death. In 1914, he was appointed Government chemist in the fifth district of the United States which position he also held until his death. His untimely death on December 9, 1926, was preceded by a short period of illness and a minor operation. Although his health was never good he led an exemplary and useful life, his efforts being directed quite largely within the fields of pharmacy and chemistry. He joined the ASSOCIATION in 1914. The deceased is survived by his widow and two sons, Dr. W. H. Weinkauff and O. J. Weinkauff.

M. DANIEL BERTHELOT.

M. Daniel Berthelot, Professor of Physical Science at the Paris Faculty of Pharmacy, died March 8th, aged 62 years. He was a son of the great scientist, Marcellin Berthelot. He received his pharmaceutical diploma in 1890 and in 1894 became Assistant Professor at his *Alma Mater*, and was awarded the Jecker prize in 1896 and, in 1906, the Hugues prize. He devoted his studies largely to physcicochemical action of life, measured the chemical activity of ultra-violet rays, reproduced the phenomena of chlorophyll assimilation, etc. He sustained with credit the difficult rôle of a son of a famous scientist.

Prof. Charles Sprague Sargeant, Director of the Arnold Arboretum since 1872, died March 22nd, aged 86 years.

STUDENT BODY ST. LOUIS COLLEGE OF PHARMACY WILL EQUIP PHARMACEUTICAL LABORATORY.

The student body of the St. Louis College of Pharmacy has officially notified Prof. Francis Hemm of their intention to equip the pharmaceutical laboratory in the new college building with the $20,000 which they have received. The notification took the form of a testimonial dinner on March 3rd, at which Dean Charles E. Caspari presided. Brief adresses were made by a number of those in attendance, each one of them bringing out some activity or quality of the guest of honor.

SOCIETIES AND COLLEGES.

INSECTICIDE-DISINFECTANT MAKERS TO MEET MAY 16TH.

The midsummer meeting of the Insecticide and Disinfectant Manufacturers' Association will be held May 16th to 18th at the Edgewater Beach Hotel, Chicago.

ASSOCIATION OF BRAZILIAN PHARMACISTS.

The officers of the Brazilian Association of Pharmacists for the ensuing diennial are:

President, Rodolpho Albino Dias da Silva.
Vice-President, Octavio Alves Barroso.
Secretario-General, Oswaldo de Almeida Costa.
Secretaries, Tito Porto Carrero and Dirceu Bastos.
Treasurer, José Gomes da Cruz.
Official Orator, José Coriolano de Carvalho.

PARIS SOCIETY OF PHARMACY.

M. Casirmir Funk of Warsaw attended the February meeting of the Paris Society of Pharmacy at which time he presented a paper on his recent studies of the isolation of certain principles obtained from internal secretions.

Prof. E. Perrot, honorary member of the A. PH. A., and Professor of Materia Medica at the Paris Faculty of Pharmacy, delivered a lecture on "Plants in the Healing Art." He outlined evolution of vegetable drugs from pre-historic times to the present day, and commented on the proficiency in toxicology often displayed by primitive races.

He referred with considerable detail to the growth of the crude drug industry and raw materials for perfumes; he stated that the exports of drugs and aromatic plants now exceeded the imports. A film was shown illustrating the collection of medicinal plants by rural school children, various phases in the perfume industry and the cultivation and gathering of medicinal plants. The effect of certain galenicals was shown—on the heart under the action of digitalis, the pupil of the eye under the influence of belladonna and pilocarpine, etc.

PHARMACY THESES IN FRANCE.

Among the theses presented during the scholastic year 1925–1926 at the Paris Faculty of Pharmacy were: Mlle. Barel's study of the percolation of extracts and tinctures; Mlle. Berman's researches on the anatomic structure of the fruit of the Boraginaceæ; Mlle. Dubois's study of dental cements; and Mlle. Seguin's researches on phagocytosis *in vitro* (Virulence and phagocytability). M. Choquette presented a thesis on *Dirca Palustris;* M. Jolivet on the idigenous *Genistæ;* M. Rousseau on some species of the *Malva* and *Lavetera* families; M. Metin on the alkaloidal content of *Aconitum Napellus*. M. Salle presented a study of some forms of benzhydrylamines; M. Morel of methylacoyl glycerins; M. Awad of the determination of acetone; M. Genevois of the estimation of xanthic bases in urine; M. Beguin a biochemical research of glucosides and sugar; M. Guillerot on Botelle's reagent in the sero-diagnosis of cancer. M. Surun submitted a contribution to the study of official vegetable carbon; M. Suta studied two methods of estimating phosphoric acid; M. Kavakibi, the determination of nitrates from a biochemical standpoint; and M. Zeki, the toxicity of sodium nitrate. *Chem. & Drug.*, March 12, 1927, page 304.

ANNIVERSARIES OF GERMAN UNIVERSITIES.

Four German universities will celebrate the anniversary of their foundation this year; namely, Wuerzburg, founded in 1402; Tuebingen, founded in 1447; Marburg, May 30, 1527; Breslau, 1702.

The German Druggists' Association has organized a propaganda week for instructing the public in the use of medicinal herbs which may be sold outside of pharmacies. For this purpose the members of the Association use their show-windows for transmitting their message to the passersby.

The Congress of Military Medicine and Pharmacy will be held in Warsaw this year.

NEW BUILDINGS FOR THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

Ground was broken for the new buildings of the Philadelphia College of Pharmacy and Science on March 17th. The first spadeful of earth was turned up with a golden spade by Mrs. Joseph P. Rennington. Addresses were made by H. C. Wood, William C. Braisted, Mrs. William E. Lee, F. X. Moerk, J. W. Sturmer, Joseph W. England and others.

The site is a most attractive one of four acres, facing the beautiful Charles H. Clark

Park. The buildings, of Georgian-Colonial type, will cover the block of Forty-Third Street, Kingsessing Avenue and Woodland Avenue. The main building will be three stories in height, of reinforced concrete and brick with limestone trim, and a basement 141 feet on Forty-Third Street and extending 141 feet along Kingsessing Avenue, having two wings of 62 by 141 feet each. The diagonal frontage is 108 feet with a depth to the rear of 135 feet. There will be, also, a building (40 x 60 feet) on Woodland Avenue for heat, light and power, and the College has ground on the north side of Kingsessing Avenue for additional buildings, when needed.

MINNEAPOLIS AND ST. PAUL VETERAN DRUGGISTS' ASSOCIATIONS.

The birthday of Charles Huhn was celebrated at the Minneapolis Veteran Druggists' Association meeting of March 18th. Miss Hazel, daughter of the celebrant, provided the birthday cake. Mrs. Josie Wanous Stewart was a hostess on this occasion. Frater F. J. Wulling gave a brief historical sketch of the Minneapolis Veteran Druggists' Association.

Mrs. Stewart invited the Minneapolis and St. Paul Associations to hold their June meeting at the Stewart summer home.

Mrs. Stewart was elected an honorary member of the St. Paul Veteran Druggists' Association.

The St. Paul Veteran Druggists' Association has been organized. President Henry Kruckeberg of the Minneapolis Veteran Druggists' Association who assisted in the organization was elected an honorary member.

The following were elected officers for the ensuing year: *President*, W. E. Burke; *Vice-President*, F. A. Conger; *Secretary*, L. J. Aberwald; *Treasurer*, Harry Iverson.

GEORGIA PHARMACEUTICAL JOURNAL.

It is very evident from the *Journal of the Georgia Pharmaceutical Association* that this official organ is proving to be very satisfactory in arousing interest and adding members to the Association. President Munn contributes a monthly page and in the February number he makes this timely statement: "It is everyone's job to take an active interest in association affairs. Our Association is not the agent or instrument of any one group or clique. It is the official mouthpiece of the druggists of Georgia. Its purpose is service in the protection of the public health and pharmaceutical interests. Whenever a member or a group holds aloof and charges that the Association is controlled by cliques, an injury is done not only to Georgia pharmacists but to organized pharmacy in general."

Secretary Frederick T. Bridges sketches briefly the members of the Georgia Board of Pharmacy composed of the following: Mack D. Hodges, Claude Rountree, J. B. Pendergrast, J. E. Bush and Jessie A. Mitchell.

MARYLAND UNIVERSITY COLLEGE OF PHARMACY SECURES A GRATIFYING SUM FROM STATE BUDGET.

Governor Ritchie's budget has received the approval of the Maryland Legislature, whereby the Dental and Pharmacy departments at Baltimore will receive $495,000. This will provide for the new building and grounds for these departments. The favorable consideration of the Governor and of the Legislature is gratifying and it is pleasing to know Governor Ritchie's estimate of Pharmacy. Last year, at the meeting of the Maryland Association, he said, that it is the Public Health contact that makes the pharmacists' activities of great significance for the State and because of this he took a keen and very active interest in it.

COÖPERATIVE BUYING IN ROUMANIA.

A central buying organization has been formed in Cluj of an association of pharmacists from which the members draw their supplies.

An agreement has been made between Rutgers University and Johnson & Johnson, pharmaceutical manufacturers of New Brunswick, N. J., to carry on research work in problems related to pharmacy at Rutgers. Johnson & Johnson will lend financial assistance to the project. The work will be supervised by Dr. Sumner C. Brooks and Prof. Thomas J. Murray.

Responsive to a questionnaire sent out by *The National Drug Clerk* the opinions of many who are in position to know have been secured, and an editorial of the publication expresses its conclusions, based on deductions from the responses, that the creation of an "Assistant Pharmacist" license was a mistake. The address of The *National Drug Clerk* is 1350–1360 Monon Building, offices are also maintained at Palmyra, Wis. and 2058–2060 N. Western Ave., Chicago, Ill.

THE PHARMACIST AND THE LAW.

APPOINTMENT OF CHIEF OF DRUG CONTROL DIVISION, BUREAU OF CHEMISTRY DELAYED.

Selection of a chief of the Drug Control Division of the Bureau of Chemistry of the Department of Agriculture is now likely to be delayed until about July 1st, when, under the provisions of the annual appropriation bill for the department, a reorganization of the bureau takes place. The understanding is that the person to whom the position was offered did not accept. He was one of the three persons rated highest in the civil service examination. In view of the general reorganization of the bureau, it has been thought wise to delay making a choice for the position.

COMMISSIONER ROY A. HAINES ASSUMES HIS DUTIES.

Formal transfer of all personnel and properties concerned with administration of the National Prohibition Act and Anti-Narcotic Laws from the Bureau of Internal Revenue to the Bureau of Prohibition was made on April 6th. Mr. Haines is granted power by the regulation to direct all affairs of the Bureau including the Narcotics Division subject only to supervisory control by the Secretary of the Treasury.

The Assistant Secretary of the Treasury, Lincoln C. Andrews, has supervisory power.

DISTRICT OF COLUMBIA WILL REQUIRE GRADUATION FROM A COLLEGE OR SCHOOL OF PHARMACY.

We are indebted to Secretary Kerfoot for a copy of the recently enacted Pharmacy law for the District of Columbia. Primarily, it is a law for the District of Columbia, but it means more than that because it is a law enacted by Congress. Section 30 of the amended law reads:

"That every person not registered under an Act to regulate the practice of pharmacy in the District of Columbia, approved June 15, 1878, who shall desire to be licensed as a pharmacist shall file with the Board of Pharmacy an application, duly verified under oath, setting forth the name and age of the applicant, the experience which the applicant has had in compounding physicians' prescriptions under the direction of a licensed pharmacist, and the name and location of the school or college of pharmacy of which he is a graduate and shall submit evidence sufficient to show to the satisfaction of said Board that he is of good moral character and not addicted to the use of alcoholic liquors or narcotic drugs so as to render him unfit to practice pharmacy; and said applicant shall appear at a time and place designated by the Board of Pharmacy aforesaid and submit to an examination as to his qualifications for license as a pharmacist: *Provided*, That applicants shall be not less than twenty-one years of age, and in order to be entitled to an examination for the determination of his fitness to be licensed as a pharmacist in the District of Columbia, must have had not less than three years' experience in the practice of pharmacy under the instruction of a regular licensed pharmacist; and must be a graduate of an accredited school or college of pharmacy: *Provided, however*, That the Board of Pharmacy, in its discretion, may establish, by general rules, conditions upon compliance with which by any school or college of pharmacy, and under the submission by said school or college of evidence sufficient to prove such compliance to the satisfaction of said Board, applicants who have been graduated by such school or college during any specified year or years may be allowed credit for experience in the practice of pharmacy by reason of attendance at and graduation by said school or college."

CAPPER-KELLY BILL (H. R. 11) AND PROPOSED SUBSTITUTE.

While Congress failed to act upon the Capper-Kelly bill, the Legislative Drafting Bureau of the House framed a tentative substitute that is said to be acceptable to all the advocates of price protection legislation. Comparative provisions of H. R. 11 and the proposed substitute follow:

KELLY BILL (H. R. 11).

1. Makes it lawful for a wholesale or retail dealer to agree with the vendor of an article to sell at the resale prices prescribed by the vendor, if

(1) The genuineness of the article is attested by the trade-mark or special brand of a producer or other trade-mark proprietor who is in fair and open competition with other producers or owners of similar or competing articles, and

(2) The contract of sale "constitutes" a transaction of interstate or foreign commerce, and

(3) The contract of sale is made by the "owner of such article."

2. Permits sale at a price other than that prescribed in any such agreement, if

(1) The vendee shall discontinue dealing in such article, or

(2) The vendee shall cease to do business, or

(3) The vendee becomes insolvent and a receiver is appointed, or

(4) The article becomes damaged or deteriorated.

3. In the event of sale under (1), (2), or (3), above, at less than agreed price, the vendor must first be given opportunity to repurchase; and under (4) must be given option to repurchase or exchange for new article.

PROPOSED SUBSTITUTE BILL.

Provides that no contract shall be deemed to be unlawful by reason of containing any agreement that the vendee (*a*) will observe the resale price stipulated by the vendor and (*b*) will require his vendee to agree to observe such prices also, if (1) The article bears the trade-mark of the producer or owner; and (2) is in fair and open competition with similar articles produced by others.

Provides that any such agreement in a contract in respect of interstate or foreign commerce shall be deemed to contain the implied condition that such commodity may be resold without reference to such price agreement, if resold—

In closing out stock to discontinue dealing in the article.

By on officer acting under orders of any court, or

With notice to the public that article is damaged or deteriorated, if such is the case.

OREGON ADOPTS PREREQUISITE.

The Oregon pharmacy law has been amended and signed by the Governor. The amendment provides that all applicants for registration as licensed pharmacists must be graduates of a recognized school of pharmacy and have had one year interneship in a drug store where poisons are sold and prescriptions compounded.

WASHINGTON PROVIDES FOR REGISTRATION OF NON-GRADUATES.

Senate bill 186 of Washington State Legislature has become a law; it provides for the registration of candidates who are not graduates of a college of pharmacy provided they have had fifteen years experience prior to the passage of the law, in 1915, and were working in the State at the time of the passage of the law.

CHANGES IN THE IDAHO LAW.

The Idaho law now provides for an automatic cancellation of all licenses on October 1st, where the annual renewal fee has not been paid prior to that date. The reëxamination fees are $10.00. Licentiates in the future need not record their licenses in the county in which they intend to practice. This is taken care of by making the proper record in the office of law enforcement. Provision has also been made so that the Technical Institute at Pocatello can become affiliated with the American Association of Colleges of Pharmacy, by the designation that the course in the Institute shall be such as shall meet the standard of requirements as now or hereafter recommended by the American Association of Colleges of Pharmacy.

CHANGES IN THE NORTH DAKOTA LAW.

Section 476 of the North Dakota laws provides that no person except a registered pharmacist may conduct a business under a name which contains as a part thereof the words "drugs, drug store, or pharmacy," or in any manner by advertisement, circular or postcard, printed or otherwise, describe or infer that the place of business is conducted by the above terms. The section not only applies to stores, but drug departments in stores. Section 487 requires that an Assistant Registered Pharmacist shall have had two years of practical experience or one year of practical experience and one year of college work. The examination fees have been raised to $15.00.

SPOTTED FEVER SERUM SEEMINGLY A SUCCESS.

In the vicinity of Shoshone, Idaho, about 145 persons have been vaccinated against Rocky Mountain spotted fever, of whom 108 are sheep herders, who will be out on the plains all summer and continually exposed to ticks.

This is the second season in which this vaccine has been used, and of those that were vaccinated last year none contracted Rocky Mountain spotted fever.

It would appear from the results already obtained with this remedy that within a few years this disease, which has heretofore resisted all efforts of control, will be added to the list of diseases which have been conquered by the advancement of science.

BOOK NOTICES AND REVIEWS.

Lehrbuch Der Enzyme. Prof. Carl Oppenheimer and Dr. Richard Kuhn. Publisher, George Thieme, Leipzig, 1927. 660 pages with eighteen illustrations.

This work on a very new important subject is a good example of German thoroughness in literature and science. The volume of some six hundred and sixty pages is, as the author Prof. Carl Oppenheimer states in the preface, intended as a textbook for doctors and students and is really an abridged form of the larger work on ferments published by the same author in several volumes. Because the work is intended more as a textbook the treatment of the subject has been condensed and literary citations have been given only where they were absolutely necessary. For further information the author refers the reader to his encyclopedic work. The great strides in the scientific development of the study of ferments and during the past decade render a work such as this very desirable especially so as the present one is very up-to-date and contains the latest information on the subject. While the greater part of the book has been written by Oppenheimer he has had the collaboration in the physical-chemical portion of it of a well-known specialist Dr. Richard Kuhn of the Zürich Polytechnicum. The work is divided into a General part and a Special part. In the General Section the general chemistry of enzymes is discussed, and their nature and classificatuon, specificity are described. Then a study of various factors which influence ferment action is taken up. The behavior of ferments as antigens receives attention, and activators and paralizators of ferments are discussed in full. The fourth chapter of this general section deals with the physical chemistry and kinetics of enzymes and ferments. Under this heading the physical chemistry and nature of the ferments is considered, the dynamics underlying their actions are taken up in detail and various theories concerning ferment action are given. The fifth chapter of the general section deals with the biology of the ferments and their occurence in nature, fermentation process in the body, and the fate of enzymes in living organism. The importance and significance in living processes take up a separate chapter of some thirty pages.

In the special section of the book a more detailed discussion of different ferments is taken up. A grand division is made into Hydrolases and Desmolases. The latter term refers to those ferments and enzymes which play an important rôle, not simply in the breaking down process, but in producing more intricate chemical reactions through oxidation and reduction, etc., as for instance in various metabolic processes. Under the first heading of Hydrolases are considered the Esterases (Zoölipases, Phytolipases, Tannases, Phosphatases, Chlorophyllases and Sulfatases). Then the Carbohydrases and Polyases including a study of sugars and Carbohydrates. Then follows a chapter on Nucleases and another on Amidases, and several chapters on the Proteases. Under the grand heading of Desmolases are considered Zymases and oxidation and reduction systems, Katalases and more complicated biological phenomena dealing with the action of insulin, etc. The work cannot be spoken of as an ordinary textbook, inasmuch as it is a far too complicated and abstruse for ordinary students and even physicians or chemists. It is, however, an invaluable book of reference to anyone whose work touches on the action of ferments or enzymes.

D. I. M.

Practical Physiological Chemistry. Philip B. Hawk and Olfa Bergeim. Publisher, P. Blakiston's Son & Co. 931 pages.

This ninth edition of the well-known work is one of the most readable books on Physiological Chemistry in the English language. The combination of the text together with practical exercises in Physiological Chemistry render it extremely useful for students and all those interested in biochemistry. This new edition contains seven new chapters dealing with some of the newer phases of Physiological Chemistry. One of these is a general discussion of the physical chemistry of true and Colloidal Solutions. Another is on Absorption, a third on Putrefraction and Detoxication, a fourth is on the Chemistry of the Blood and Tissue Analysis. A fifth is on Respiratory Metabolism and Neutrality Regulation, and two other chapters deal with Endocrine Organs and Energy Metabolism respectively. The whole book is very much up-to-date and deals with, not only, the regular routine procedures of medical physiological laboratories but also with biochemistry in general. Thus for instance there is a special discussion of Photosynthesis. Vitamins and Vitamin Assays have re-

ceived a special consideration. One of the chapters deals with Ultraviolet Radiation which is coming more and more into prominence in various departments of biology. With the modern trend towards physical chemistry a great deal of attention is paid to an exposition of physical chemical procedures and theories. Throughout the book there are numerous references to most recent articles of importance in biochemical literature and a special emphasis is given to review articles which are of great value to the teacher, physician and investigator. The authors have received coöperation as well as commendation and moral encouragement from some of the leading biochemists in the country. The whole volume is very elegantly gotten up. The use of different type for the text and laboratory directions is very appropriate and the whole volume is profusely illustrated with useful drawings and charts in addition to a number of full-page color plates. Altogether we consider this textbook an extremely useful one to keep on the library shelf of any medical or biological laboratory. D. I. M.

Volumetric Analysis for Students of Pharmaceutical and General Chemistry. Fourth Edition by Charles H. Hampshire. P. Blakiston's Son & Co; Philadelphia. Price $1.75.

This little book of 125 pages, written for students, is one of the best of its class.

It is refreshing to note the absence of the conventional introductory chapters on Calibration, Weighing, Apparatus, Indicators, Ion Concentration, etc., which surely discourage the beginner and make the task of the instructor doubly onerous. Imagine the impressions made on a beginner when confronted with an incomprehensible mass of technical details such as is customary in many of our books on Volumetric Analysis.

Mr. Hampshire plunges directly into the essentials, that is the practical work, in a simple, direct and comprehensible style, that cannot fail to awaken the interest and understanding of the dullest student.

Every operation is accompanied by its necessary calculations made especially easy, while the use of Empirical Solutions, incomprehensible or rather confusing to many, is adroitly introduced among the first examples.

It has always seemed to me that when introducing something that deviates from the straight and narrow path of the beginner's line of work, it is best to work it in incidentally until comprehended, then dilate. In other words, do not herald such as new matter under special chapters until later.

All essential points necessary in securing accuracy while handling calibrated vessels are introduced by degrees in the course of the student's work. He is made to note the value of accurate calibration, the proper methods in pipetting and precautions as to temperature.

Five indicators are introduced and applications thoroughly and clearly explained after having previously trained the worker on methyl orange.

Various chapters on Acidimetry, Alkalimetry, Oxidation and Reduction Reactions and Precipitation Reactions are followed by a section on Miscellaneous Reactions. Under this head, we find determinations of mixtures such as sulfuric and oxalic acids with hydrochloric and phosphoric acids, ferrous and ferric iron, boric acid and borax, etc.

Calculations exemplify every titration given including all B. P. chemicals. This affords every variety of titrations known under volumetric analysis.

Mr. Hampshire has entirely eliminated the worn out incorrect term "estimation;" he "determines" his unknowns. The index is rather laconic.

A splendid little book for every pharmaceutical chemist as well as student.

The press work is characteristic of Blakiston.

VIRGIL COBLENTZ.

Hydrogen Ion Concentration. Its Significance in the Biological Sciences and the Methods for Its Determination—By Leonor Michaelis, M. D. Professor in the University of Berlin, Resident Lecturer in Research Medicine in the Johns Hopkins University. Volume I, Principles of the Theory, represents the authorized translation from the second revised and enlarged German edition by William A. Perlzweig, Ph.D. of Johns Hopkins University and Hospital. Cloth bound, 6 x 9, publishers, The Williams & Wilkins Company, Baltimore, Md. Price $5.00.

This book represents a concise and yet comprehensive outline of the theoretical physicochemical principles of hydrogen-ion concentration. It is to be followed up by two further volumes in which will be presented the methodology and the colloid-chemical physiological and medical applications. From this it will be noted that this edition is presented especially for the consideration of biological readers. The present volume, however, deal-

ing primarily with theories, is of great importance and interest to the modern chemist in general since the applications of hydrogen-ion concentration are developing rapidly in all branches of this science.

In Part I of the book the chemical equilibrium of the ions is discussed, the laws of electrolytic dissociation, the theory of the quantitative determination of acidity and alkalinity, the ionic phases of salt formation and the electrolytic dissociation in non-aqueous solutions.

In Part II the potential differences of ions are considered particularly in the direction in which they are to have a probable physiological bearing. The several groups such as electrode potentials, diffusion potentials, phase boundary potentials, membrane potentials and absorption potentials are discussed.

An interesting phase of the book are the summaries of contents which precede each chapter. These represent abstracts of the work covered in any given chapter, in some cases covering more than a half page and enable one to obtain a bird's-eye view of the subject matter and scope of the particular chapter.

A large number of references are provided, thereby giving the reader a rather complete bibliography on the subject. It might be mentioned that the more recent advances in chemistry, those since the printing of the original German edition of the book have been included in the translation by a number of addenda to the text.

The book therefore offers the subject of ion concentration in a complete and thorough form not only to the research chemist but also to the advanced student. It is not a textbook for the average man studying chemistry but should be of the highest value to the biological and medical research student.

HUGO H. SCHAEFER.

Textbook of Pharmacy. By A. O. Bentley. Demy 8 vo., + 540 pp. Illustrated with 103 figures. Published by Baillière, Tindall and Cox, London. Price 15s. net.

The statement has frequently been made in this country, especially by members of the other professions, that pharmacy is nothing but applied botany and chemistry and that there is little justification for treating it as a separate subject in our schools and colleges. These critics point to our textbooks in pharmacy in support of their contention and this is a difficult argument to meet in view of the fact that nearly all of our textbooks do attempt to cover the fields of botany, chemisty and physics and, in some cases, bacteriology, serology, immunology accounting, store management, etc. It is therefore a pleasure to review a book which deals almost exclusively with real pharmacy and which we as pharmacists may point to in support of our viewpoint.

The author states that the book is intended to cover the requirements in general and official pharmacy of the syllabuses of the Pharmaceutical Society of Great Britain and of the qualifying examinations of the various pharmaceutical societies and boards of the British Empire. The subject of dispensing, including the making of pastilles, tablets, etc., has not been dealt with for the reason that there are other excellent and specially written treatises on these subjects.

The subject matter of the book has been divided into three parts. Part I deals with the commonly employed pharmaceutical operations. Part II is concerned exclusively with the preparations of the British Pharmacopœia and Part III covers the additional subjects in pharmacy that are contained in the syllabuses for the Pharmaceutical Chemist Qualifying Examination of the Pharmaceutical Society of Great Britain and the B. Pharm. Examination of the University of London. These subjects are the preparation of vaccines, sterilization, surgical dressings and enzymes.

A special feature of the book which distinguishes it from our textbooks on pharmacy is that a number of practical exercises have been included. At the end of every chapter in Part II there is given a number of exercises which are intended to give the student practice in making the different types of preparations discussed.

The book is by an experienced teacher of pharmacy and is well written. While it cannot serve as a text in our schools of pharmacy, because of the fact that it is based on the British Pharmacopœia, yet it should find a place in our pharmaceutical libraries as a reference book and there is much material in it which recommends it to the practicing pharmacist.

A. G. DUMEZ.

Edible Oils and Fats. Their Chemistry and Examination, Their Substitutes and Adulterants. By G. D. Elsdon, B.Sc., F. I. C., Liverpool. D. Van Nostrand Company, New York. 521 pp. Price $12.50.

The author has made an effort to bring this book up-to-date, including modern methods without discarding those which have proven to be of value in the past and some methods are also mentioned which have not yielded satisfactory results. Many suggestions have been added to these discussions and a large number of references are cited. Preference is given to abstracts in the *Analyst* and in the *Journal of the Society of Chemical Industry* (Great Britain).

The volume is divided into 31 chapters in which there are 273 tables; there is also an index of authors, a subject and a botanical index. Oils and Fats are classified in the first chapter and in the next their properties are discussed, followed by a chapter on their composition. Then the constituents are given consideration, followed by several chapters on qualitative, physical and chemical tests. Succeeding chapters treat of oils and fats in groups and singly, a chapter deals with medicinal oils and another with hydrogenated oils.

The large number of tables are convenient for the oil chemists and indicate to others as well the related characteristics of classified oils, their composition, etc. The illustrations show various methods of assay and apparatus used by the oil analyst. While the book is primarily for British oil chemists, a more general service has been rendered by the author in bringing the analytical methods employed by oil chemists into one volume. As indicated, the work is, probably, of greater value to British chemists than to those of this country, however, the methods are informative and may, in some instances, prove to be better or more rapid than those in use here, and serve those who are interested in export trade and for determining their comparative value with American products.

More attention has been given by the author to the analytical study of fats and oils than to their manufacture; the discussion of hydrogenated oils is not as comprehensive as that of other works, and may indicate that the industry has not assumed the large proportions in Great Britain which it has in the United States.

Chemists using the book will take the differences that obtain in refined products into consideration. The printing, paper, press work and binding of the volume are good, and it seems to be quite free from typographical errors. E. G. E.

*The New Dutch Pharmacopœia.**—The fifth edition of the "Nederlandsche Pharmacopee" presents many fundamental changes. The work, for reasons of economy, appears in Dutch and not as hitherto in Latin, the latter being retained only in the official titles. The chief innovation is a collective description of standard tests and reactions to determine the identity and purity of official substances, which are grouped together in the preface, a new feature in a Continental pharmacopœia. Thus, a liquid is alkaline to phenolphthalein if 10 cc. assume a pink to red coloration on the addition of one drop of 1:100 phenolphthalein solution; a liquid may be described as colorless if its tint is not deeper than that of the following three comparative solutions: (1) A yellow solution, containing 0.001 Gm. of potassium bichromate in 1000 cc. of water, acidified with dilute sulphuric acid; (2) a pink solution, containing 0.1 Gm. of cobalt nitrate in 1000 cc. of water, acidified with dilute hydrochloric acid; (3) a blue solution, containing 0.231 Gm. of copper sulphate in 1000 cc. of water, acidified with dilute hydrochloric acid.

The standard for limpidity is comparison with a suspension of 0.005 Gm. of kaolin (average diameter of the particles 20μ) in 1000 cc. of water. The tests for purity command special attention—yields no reaction is given a precise definition; in fact, in the new Dutch Pharmacopœia the reactions for the more commonly occurring impurities have become essentially limit tests. Thus, "yields no reaction for iron" means that the addition of 1 cc. of solution of ammonium chloride (107:1000 $N/2$) and 3 drops of solution of sodium sulphide (84:1000 $N/1$) to 5 cc. of the liquid to be tested, rendered alkaline by the addition of solution of ammonia, should not produce a green coloration deeper than that which occurs on applying the same test to a solution containing 0.002 Gm. of trivalent iron in 1000 cc. of water (0.0172 Gm. of ferric ammonium sulphate in 1000 cc. of water, acidified with sulphuric acid). Chlorides: the cloudiness produced by the addition of solution of silver nitrate to 5 cc. of the liquid to be tested, and acidified with nitric acid, should not exceed that which occurs in a solution containing 0.005 Gm. of chlorine (0.0083

* The review is a partial reprint of an editorial in the *Chem. & Drug.;* in part, the matter is condensed and abstracted.—E. G. E.

Gm. of sodium chloride) in 1000 cc. The comparative standard for calcium is a solution containing 0.01 Gm. of calcium (0.219 Gm. of solution of calcium chloride 25 per cent) in 1000 cc.; for heavy metals, 0.001 Gm. of lead (0.0016 Gm. of lead nitrate) in 1000 cc.; for nitrates, a solution with 0.002 Gm. of nitrogen trioxide (0.00326 Gm. of potassium nitrate) in 1000 cc.

The resolutions adopted at the Second International Conference for the Standardization of the Formulas for Potent Preparations, held in Brussels in 1925, have not been embodied in this edition, since they have not yet received official recognition by the Netherlands Government, and also for the fact that the work was already in the press when the Conference was held. As soon as the agreement is ratified the changes entailed in the Pharmacopœia will be published in the form of a Supplement. No alteration has been made in the Latin nomenclature, neither has any attempt been made to coin arbitrary official designations to take the place of lengthy chemical appellations; registered trade-marks included among the synonyms are designated by an asterisk. Compared with the preceding edition, the text of the single monographs is presented in a much clearer and more logical form; descriptions of entire drugs have been somewhat curtailed; on the other hand, the microscopic characters of powdered drugs are fully described. It is interesting to note that the refractometer is used to a much greater extent than in any other pharmacopœia, the determination of the refractive index being regarded by the authors of this work as a quick and reliable method of assay. Hence this index is given for 47 articles, including, *inter alia*, essential and fixed oils, certain solutions acetic ether, glycerin, creosote, creosote carbonate, crude cresol, guaiacol and liquefied phenol. The optical rotation figures among the tests for the official salts of quinine. In many instances the specific gravity (at 15° C.) is followed by an indication of the correction for each 1° C. difference in temperature, *e. g.*, glycerin sp. gr. 1.230–1.235 (correction 0.0006 for 1° C.). The solubility of a substance in water, alcohol and ether at 15° C. and 25° C. is given in several cases in tabular form at the end of the monograph. Sterilization forms the subject of a special article, in which the procedure to be adopted for sterilizing a number of specified medicaments is described in detail. Digitalis is the only drug for which physiological standardization is prescribed, by the Hatcher-Magnus method, which is based on the determination of the minimum lethal heart dose, by continuous intravenous injection of a 1:200 infusion into an anaesthetised cat under artificial respiration. Assayed by this method, digitalis leaves are required to have a value of 17.5 to 20, and if they do not correspond with this standard, adjustment has to be effected by the admixture of leaves with a lower or higher potency, as may be required. To ascertain Focke's valor the above figure is divided by 75. A monograph entitled "Olea Pinguia" is devoted to a description of certain specific tests applicable to fixed oils: Recognition of the presence of mineral oil, resin oil, sesame oil cottonseed oil, arachis oil, sulphur products, heavy metals, determination of the melting point, optical rotation, acid value, saponification value and of the "additive value" (*i. e.*, the iodine value).

Quite a number of the additions made correspond with those of the German Pharmacopœia. Two new preparations of digitalis have been included, one for injection and the other for oral administration. The chapter describing the immediate antidotal treatment to be undertaken in cases of poisoning has been revised in accordance with recent progress. The appendices include much matter that is included in U. S. P., also a list of the medicaments which medical practitioners entitled to supply medicines to their patients are required to keep in stock; a schedule of the official poisons to be stored in a locked cupboard, which includes, *inter alia*, adrenalin, ethylhydrocupreine hyhydrochloride, ethylmorphine hydrochloride, luminal, novocaine hydrochloride, and strophanthus seeds; a list of poisonous official substances which must be labeled with a blue cross, and a general index, in which, in tabular form, the maximum doses, as well as directions regarding storage, *e. g.*, to be protected from light, are given.

INDIA'S EXPORT TRADE IN CINCHONA, NUX VOMICA AND SENNA.

Indian exports of nux vomica and senna, increased during the first six months of last year. However, shipments of cinchona during the same period were very much less than during the previous year.